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Initialled abstracts and reviews not by Bureau staff are by R. J. Garner, D. W. P. Greenham, A. M. Massee, S. C. Pearce, H. M. Tydeman of the East Malling Research Station, E. W. Hobbis of Long Ashton Research Station, G. St. Clair Feilden, and staff of the Obstbauversuchsring Jork, Germany.

INDEX OF CONTENTS.

Total Abstracts 947. Noted 130.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

2640. BACON, L. B., AND OTHERS.
Agricultural geography of Europe and the Near East.
Misc. Publ. U.S. Dep. Agric. **665,** 1948, pp. 67, 63 maps, graphs.
The concise but very informative text, covering such subjects as climate, vegetation, soils, population, land utilization, distribution of crops, the livestock industry, and Europe's position in international trade, is fully illustrated by maps and graphs, based on pre-war data.

2641. RICHARDSON, B. T.
Workers in subjects pertaining to agriculture in land-grant colleges and experiment stations 1948-49.
Misc. Publ. U.S. Dep. Agric. **677,** 1949, pp. 175, 35 cents.
A useful compilation showing the names of workers, their subjects, official titles, and the institution or department for which they work. There is an index of names.

2642. GASSNER, G.
Die Biologische Zentralanstalt der US- und britischen Zone. **(The Biologische Zentralanstalt in Western Germany.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 1-3.
The branches of the old " Biologische Reichsanstalt ", located in the British and U.S. Zones of Germany, were united in 1947 in the Biologische Zentralanstalt with its headquarters in Braunschweig and the author as first president. History and aims are briefly discussed and the institutes attached are listed.

2643. KLAPP, E.
Landwirtschaftliche Anwendungen der Pflanzensoziologie. **(The application of plant sociology in agriculture.)**
Agrarwiss. u. Agrarpolitik, 1949, Hft. 14, pp. 77-96.
The subject is reviewed in a paper read at a meeting of the agricultural faculty of Bonn University.

2644. HURST, R.
The R.H.S. and the birth of genetics.
J. roy. hort. Soc., 1949, **74**: 377-90, bibl. in text.
A short historical review showing the important role played by the Royal Horticultural Society, London, in establishing the science of plant breeding.

2645. ASHTON, T.
Better crops through hybrid seed.
World Crops, 1949, **1**: 51-4, illus.
The author concludes that, although hybrid vigour is " one of the more important methods available to the plant breeder for improving crop varieties, its uses are, however, limited by the character of the crops themselves and it is only when these are favourable that it can be widely applied. It is, for example, unlikely that, except possibly in the case of a few crops, hybrid seed will oust the use of ordinary seed to the extent that has been the case in the corn belt of the U.S.A."

2646. ANON.
Seed testing for uniformity.
Seed World, 1949, **65,** 2: 48-9 and 60, illus.
The causes of variation in the results of seed purity tests, such as the difficulty of determining damaged seed, the interpretation of normal and abnormal seedlings in germination tests, and different sampling methods and instruments, are discussed, and also the steps being taken in the United States to overcome this variation.

2647. MIDDLETON, W. E. K.
Color standards for biologists.
Science, 1949, **109**: 617.
There is a movement on foot to prepare a modern colour chart, adequately standardized, and comprehensive enough to meet the requirements of all biologists, horticulturists, and technical agriculturists. Enquiries instituted by a committee set up by the National Research Council of Canada showed that Ridgway's chart is most familiar to biologists and most used by them, followed by the Royal Horticultural Society's charts and the Munsell Book of Color, in that order. There was almost unanimous agreement that each colour must have a name, and so it appears that the numerical specification of colour, familiar to physicists, is not yet acceptable to biological workers.

2648. PIGORINI, L.
La produzione serica sull'orlo dell'annientamento. **(Italian silk production on the verge of extinction.)**
Ital. agric., 1949, **86**: 397-402.
A note by the author, who is director of a silk research station at Padua, on the chaotic state of silk production in Italy with no liaison between producer and manufacturer or even between producer and producer. Unless the government acts quickly and takes the situation firmly in hand, the end is inevitable. In a note " Vedo " states that there are two stations supposed to work on sericulture but that their funds are negligible.

2649. F.A.O.
Food composition tables for international use.
[*Mimeo. Publ.*] *F.A.O.* **N49/Tech/9,** 1949, pp. 52, bibl. 158.
The main avowed purpose of this publication is to facilitate the last step in the process of drawing up food balance sheets and to introduce into it a greater degree of uniformity. Figures are given on composition in terms of retail weight of calories, protein and fat percentage, and on composition of the edible portion and refuse in the material as purchased. A large number of the more common fruits and vegetables are included.

2650. HOWES, F. N.
Honey and its sources.
Food, 1949, **18**: 106-10, illus.
Some of the main botanical sources of honey in various parts of the world, as well as sources of objectionable or poisonous honey, are considered.

2651. HOWES, F. N.
Sources of poisonous honey.
Kew Bull., 1949, No. 2, pp. 167-71, bibl. 8.

The plant sources listed as suspect include some ornamentals, e.g. *Rhododendron ponticum* and Carolina jasmine (*Gelsemium sempervirens*).

Climatic factors.

(*See also* 2709c, e, 2764.)

2652. GODARD, M.
Microclimats et mésoclimats du point de vue agronomique. **(Microclimate and macroclimate from the agricultural point of view.)**
Ann. agron. Paris, 1949, **19**: 578-604, bibl. 39.

A general discussion of the subject dealing with methods of measurement, the climate above uncultivated soil, the microclimate of cultivated plants and the topography of the macroclimate. The considerable difference which exists between macro- and microclimate on calm and sunny days should be taken into account in the interpretation of data.

2653. FLIPSE, L. P.
Ontwikkeling van de studiekring voor ecologie en phaenologie gedurende de jaren 1943-1947. **(Development of the study circle [of the Netherlands' Society for Agricultural Science] for ecology and phenology during the years 1943-1947.)**
Landbouwk. Tijdschr., 1949, **61**: 47-51.

The work of this circle, here briefly outlined, is divided among various groups studying the following and other subjects. (1) *Microclimate :* especially the occurrence and damage of night frosts, (2) *Bulb crops :* measurements of ground temperature and water tables, (3) *Insect pests :* apple sawfly, apple blossom weevil, and cabbage gall midge, and (4) *Greenhouse crops :* effect of the relationship between greenhouse and outside temperatures on the development of peaches and grapes.

2654. B., J. K.
South African rain-making experiments.
Weather, 1949, **4**: 155, being abstr. from *S. African C.S.I.R. Report, Series M.*

Cloud seeding experiments were made in S. Africa during the summer of 1947/48, and the results observed by means of a 3 cm. wavelength radar on the ground as well as visually from aircraft. This report confirms earlier experiments that on suitable occasions rain may be induced by seeding clouds with dry ice.

Physiological problems.

(*See also* 2709g, i, k, q, s, t.)

2655. BERGER-LANDEFELDT, U.
Über den Wasserverbrauch von Pflanzenverbänden. **(The water consumption of plant associations.)**
Planta, 1949, **37**: 6-11, bibl. 17.

A simplified method of determination is suggested.—Inst. for Agricultural Botany, Berlin-Dahlem.

2656. HAGAN, R. M.
Autonomic diurnal cycles in the water relations of nonexuding detopped root systems.
Plant Physiol., 1949, **24**: 441-54, bibl. 15, illus.

Intake of water through the stumps of detopped root systems of sunflower (*Helianthus annuus*) was investigated. Intake proceeded at a high rate initially, approaching zero within a few days, and the rate followed a diurnal cycle with distinct maxima at midnight and minima at noon. It is shown that the cause of this cycle lies within the root, and is not dependent on a periodic transfer of water between root and soil.—Univ. of California, Davis.

2657. SCHWANITZ, F.
Untersuchungen an polyploiden Pflanzen. IV. Zum Wasserhaushalt diploider und polyploider Pflanzen. **(A study of polyploid plants. VI. The water balance of diploids and polyploids.)**
Züchter, 1949, **19**: 221-32, bibl. 56.

In the plants studied, including digitalis, sage, deadly nightshade, mustard, chicory and several *Brassica* spp., polyploidy was found to be associated with certain anatomical changes, which reduce transpiration considerably, especially under particular conditions. The resulting tendency to succulence increases drought resistance, which accounts for the frequent occurrence of polyploid plants in arid regions. In freezing experiments the polyploids were shown to be more susceptible to low temperatures. Where, however—as is often the case—cold injury is due to loss of water (in windy weather) which cannot be replaced owing to the low soil temperature, higher valency confers increased resistance on the plant. On the other hand, the lower rate of transpiration reduces the uptake of mineral salts from the soil, so that tetraploids cannot take full advantage of the available nutrients and, as a rule, do not give yields superior to diploids.—Baden Branch of the Kaiser-Wilhelm Inst. f. Züchtungsforschung, Rosenhof nr. Ladenburg a.N.

2658. LEWIS, F. J.
Transpiration from the cell walls of the mesophyll of the leaf.
Brit. Sci. News, 1949, **2**: 339-42, bibl. 8, illus.

Transpiration from the actual tissue of the leaf occurs through the walls of the mesophyll cells. Observations on the physical nature of the mesophyll, made chiefly with *Ficus elastica*, showed among other things that the outer surfaces of the walls of the mesophyll cells are highly hydrophobic. This fact raises the question whether evaporation really takes place from the moist surface of the mesophyll cells, and suggests the possibility of active secretion of water. No observations, however, were made on this point.

2659. VICKERY, H. B., LEAVENWORTH, C. S., AND BLISS, C. I.
The problem of selecting uniform samples of leaves.
Plant Physiol., 1949, **24**: 335-44, bibl. 9.

The reliability of 3 methods of leaf sampling, the statistical method, the opposite leaf method and the leaf size method, is compared. The statistical method gave the most uniform samples; to obtain the same precision by either of the other two methods, 4-5 times as many samples would be needed.—Connecticut agric. Exp. Stat., New Haven.

2660. BLACKMAN, G. E., AND RUTTER, A. J.
Physiological and ecological studies in the analysis of plant environment. IV.* The interaction between light intensity and mineral nutrient supply on the uptake of nutrients by the bluebell (*Scilla nonscripta*).
Ann. Bot. Lond., 1949, **13**: 453-89, bibl. 27.
A reduction of the light level to 0·2-0·22 of daylight causes a diminution in the absorption of nitrogen and phosphorus, but not of potassium. The influence of shading on N, P and K uptake is in part dependent on nutrient supply. Shading increases the percentage content of N, P and K in bulb and shoot. The increases are largest for potassium and least for phosphorus. The effects of light intensity on the percentage contents are relatively unaffected by the nutrient supply level. Lowering the light intensity leads to an increase in the total amount of N, P and K in the shoot but reduces the amounts found in the bulb. [From authors' summary.]

2661. LEOPOLD, A. C.
Flower initiation in total darkness.
Plant Physiol., 1949, **24**: 530-3, bibl. 9, illus.
In order to test the theory that completely etiolated plants may not require light for flower initiation, several species were raised in complete absence of light from time of planting. Biloxi soybeans failed to produce flower primordia in the dark. Irish Cobbler potatoes, however, produced abundant flowers from the sixteenth node upwards after 6 weeks in the dark, Alaska peas developed primordia at the seventh node 18 days after germination, and red Kidney beans at many nodes from the cotyledon axils up. It is suggested that the plant may be capable of producing the flower-inducing hormone in darkness when an abundance of stored material is available, as in a tuber or fleshy cotyledon.—Hawaiian Pineapple Company.

2662. PEARSALL, W. H.
Autumn colours.
Endeavour, 1949, **8**: 157-62, illus. in colour.
The author explains how and why the autumnal colours are developed; he shows that the changes are intimately connected with a seasonal life-cycle, and relates them to other colour-changes in plants.

2663. GOEDEWAAGEN, M. A. J.
Een en ander over de methodiek van het wortelonderzoek op bouw- en grasland. **(On the technique of root investigation in cultivated and grass land.)**
Maandbl. Landbouwvoorld, 1949, **6**: 194-200, bibl. 10.
The technical difficulties encountered in the field study of root systems and means of overcoming these difficulties are discussed.

2664. PEARSALL, W. H.
Nitrogen metabolism in plants.
Endeavour, 1949, **8**: 99-105, bibl. 12.
Examples taken by the author from the discoveries of different workers on many different plants suggest that a knowledge of the physiology of the synthesis and degradation of protein will provide an important means of integrating many phenomena of plant metabolism.

* For parts I, II and III see *ibid.*, 1946, 10: 361; 1947, 11: 26 (*H.A.*, 17: 1133); and 1948, 12: 1 (*H.A.*, 18: 806).

2665. ADDICOTT, F. T., AND OTHERS.
A method for the study of foliar abscission *in vitro*.
Plant Physiol., 1949, **24**: 537-9, illus.
" The technique described is a valuable tool for the investigation of leaf abscission under controlled conditions." Essentially this method consists of excising small pieces of tissue, including one or more abscission zones, and using these pieces, called explants, for experimentation. In addition it gives promise of being adaptable to experiments with the abscission of flowers, fruits and stems. Explants were made of citrus, *Phaseolus* and *Coleus*.—Univ. of Calif., Los Angeles.

Growth substances.

(*See also* 2709j, m, v, 2780, 2795, 2797-2799, 2836, 2856, 2887, 3000-3072o, 3158, 3159, 3201-3206, 3294, 3404, 3475, 3550, 3575.)

2666. ANON.
Growth-promoting substances in agriculture and horticulture.
Nature, 1949, **164**: 91-3.
A summary of the papers forming a symposium arranged and held by the Association of Applied Biologists in London in March, 1948. Speakers dealt with the manifold uses of growth substances, among their subjects being:—the inducement of parthenocarpy in pears, the control of fruit drop, the chemical aspects of growth-regulating activity, the use of growth substances in vegetative propagation, fruit drop in relation to seed development in the apple. [These papers will doubtless appear in full in *Annals of Applied Biology* when they will be abstracted. Meantime the reader may care to consult this excellent summary.]

2667. SIVORI, E. M.
Hormonas vegetales. **(Plant hormones.)**
Cien. y Invest., 1949, **5**: 189-202, bibl. 44, illus.
A definition and brief classification of plant hormones is followed by an account of methods of determining growth activity, their chemical structure and physiological action. Finally the use of plant hormones in agriculture is summarized.

2668. LUCKWILL, L. C.
Fruit development in relation to plant hormones.
Endeavour, 1949, **8**: 188-93, bibl. 14, illus.
" Recent work on plant hormones has shown that these substances play a vital role in the initiation and control of fruit growth. They are also known to control the process of abscission, which is the immediate cause of fruit-drop in apples and similar fruits. In this article, the importance of developing seeds as centres of hormone production in the fruit is stressed, and it is shown that appreciation of this importance has led to a fuller understanding of many previously known facts relating to fruit-development and fruit-drop."

2669. LUCKWILL, L. C.
Hormones in the fruit garden.
The Fruit Year Book 1949, R.H.S. Lond., pp. 51-4, and *J. roy. hort. Soc.*, 1949, **74**: 397-401.

Discusses the use of hormones in relation to fruit-set in tomatoes, inducing seedless fruits, delaying bud burst, prolonging dormancy (e.g. in potatoes), reducing pre-harvest drop of apples and pears, reducing "June drop", and destruction of weeds.—Long Ashton Research Station.

2670. EVENARI, M.
Germination inhibitors.
Bot. Rev., 1949, **15**: 153-94, bibl. 180.
A study of the occurrence, chemical nature and physiological action of substances produced by plants (or synthetic substances of a related structure) that inhibit or delay the germination of seeds. A table of the distribution and localization of germination inhibitors shows that they are widespread throughout the plant kingdom, and can occur in any part of the plant. They are non-specific in their effects. The main known inhibitors are hydrogen cyanide, ammonia, ethylene, mustard oils, organic acids, unsaturated lactones, aldehydes, essential oils and alkaloids. In some of these groups a relation between inhibiting activity and chemical structure of the inhibitor can be established. Germination inhibition is nearly always accompanied by stimulation of germination. Sometimes inhibition and stimulation appear in different concentrations, sometimes one after the other in the same concentration. The biological function of inhibitors is discussed. —Hebrew University, Jerusalem.

2671. RAKITIN, JU. V.
The internal factors of fruit formation and growth-regulating substances. [Russian.]
Vestnik Akad. Nauk S.S.S.R., 1948, No. 7, pp. 49-67.
The author discusses in general terms the role of growth substances in fruit production in relation to parthenocarpy, xenia, pericarp development, fertilization, fruit drop, and fruit ripening, and then in more detail their effect in producing seedless fruit in tomato and other fruit plants, reducing early drop of apples and pear and of cotton bolls, hastening flowering in pineapple, and in controlling biennial bearing. He also deals with the effect of ethylene in hastening ripening in different fruits.

2672. MUIR, R. M., HANSCH, C. H., AND GALLUP, A. H.
Growth regulation by organic compounds.
Plant Physiol., 1949, **24**: 359-66, bibl. 22.
The effects on the straight growth of *Avena* coleoptiles of several organic compounds, reported to have growth-promoting properties, are compared with those of indoleacetic acid. IAA and 2,4-D were found to have equal growth activity as measured by cell elongation. "The growth activity of 2,4-D and other phenoxyacetic acids can be related to chemical structure by the supposition that the position on the benzene ring adjacent to the point of attachment of the side chain is directly involved in the growth reaction."—State Univ., Iowa, and Pomona College, Calif.

2673. RAWES, M. R., AND HATCHER, E. S. J.
A method for estimating hormone activity in the plant.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 157-9, illus.
A popular account (with 8 photographs) of the "*Avena* coleoptile test" for auxins as used at East Malling.

2674. MOEWUS, F.
Der Kressewurzeltest, ein neuer quantitativer Wuchsstofftest. **(The cress root test, a new quantitative growth substance test.** [English summary 7 ll.]
Biol. Zbl., 1949, **68**: 118-40, bibl. 25.
A full discussion of the method and its application. [See *H.A.*, 19: 1722 and 1723.]

2675. DRAWERT, H.
Beiträge zur Stimulation des Pflanzenwachstums. II. Mitteilung. Der Einfluss von Heteroauxin auf die Samenkeimung. **(The stimulation of plant growth. II.* The effect of heteroauxin on seed germination.)**
Planta, 1949, **37**: 1-5, bibl. 7.
Treatment of fruits and seeds of *Cichorium endivia* with β-indoleacetic acid did not stimulate germination, while higher concentrations of the chemical, such as 0·01 and 0·001 mol., delayed it.

2676. KRUYT, W., AND VELDSTRA, H.
Researches on plant growth regulators. XII. Comparative investigation of a number of homologous and isomeric synthetic growth substances in the rooting of cuttings.
Reprinted from *Proc. koninkl. nederl. Akad. Wetensch.*, 1947, Vol. **50**, No. 8, pp. 11, illus. [received 1949].
The activity of the potassium salts of α- and β-naphthaleneacetic acid, α- and β-naphthalenepropionic acid and α- and β-naphthalenebutyric acid was compared with that of β-indoleacetic acid and β-indolebutyric acid on cuttings of *Viburnum burkwoodii* Burkw., and the findings are discussed here.

2677. KRUYT, W., AND VELDSTRA, H.
Researches on plant growth regulators. XIII. Leaf growth factors.
Reprinted from *Proc. koninkl. nederl. Akad. Wetensch.*, 1947, Vol. **50**, Nos. 9 and 10, pp. 16, bibl. 11 [received 1949].
The effect of adenine on the leaf growth of *Cosmos bipinnatus* was not so great as that found by previous investigators, amounting only to an increase of 15% in the best groups. The figures for some other growth substances, which were also studied, are slightly lower.

2678. VELDSTRA, H., AND HAVINGA, E.
On the physiological activity of unsaturated lactones.
Enzymol., 1943-45, 11: 373-80, bibl. 14 [received 1949].
Dealing with the inhibition of seed germination and longitudinal root growth.

2679. HOFFMANN, O. L., AND SMITH, A. E.
A new group of plant growth regulators.
Science, 1949, **109**: 588.
A new group has been discovered, the N-aryl phthalamic acids, the general formula of which is given. Data from a field test in which flowering tomatoes, whole plants, were sprayed with compounds of this group, are tabulated. A general pattern of response

* For part I see *ibid.*, 1948, 35: 555.

is evident. At low concentrations fruit set is stimulated, seedless fruits are often produced and a broadening of the leaves is usually evident. At higher concentrations the formative effect is more pronounced, fruit set is inhibited and may be greatly diminished at concentrations which do not decrease vegetative growth. At still higher concentrations (about 2,000 p.p.m.) tomato plants were injured, but seldom killed, by the more toxic compounds of the group.

2680. SCHOENE, D. L., AND HOFFMANN, O. L.
Maleic hydrazide, a unique growth regulant.
Science, 1949, **109**: 589-90, bibl. 1, illus.

This compound, the structure and some properties of which are given, has been found to have a pronounced, but temporary, inhibiting effect on plant growth, the duration of which appears to be directly proportional to the concentration used. This effect seems to be unique in that growth inhibition is obtained with little visible harm to the plant. Experiments with it are briefly described.

Machinery.

(*See also* 2688, 2689, 2698, 2699, 2774, 3214, 3490f.)

2681. SOUTHWELL, P. H.
Machinery for land clearance and initial cultivation.
World Crops, 1949, **1**: 107-10, illus.

The most important devices at present available for the mechanical clearance of land are briefly reviewed and described.

2682. HOARE, E. R.
The development and manufacture of farm machinery in Britain.
J. roy. agric. Soc., 1947, **108**: 183-93, bibl. 21.

In his review of mechanical progress in horticulture the author deals with the progress made in the various fields of practical horticulture. In discussing soil preparation he mentions, *inter alia*, the rotary hoe and rotary cultivator and their prospects. He considers in turn vegetables in the open, glasshouse crops, flowers and fruit, all with their different specific problems, and he remarks that, whereas in agriculture it is the horse which has been replaced by the machine, in horticulture it is hand labour itself which tends to be replaced or rather aided, some of the developments in horticultural mechanization having been in that direction.

2683. BROWN, C. A. C., AND GOLDING, E. W.
The application of electricity to horticulture.
Reprint from *J. Inst. elect. Engnrs*, 1948, **95**, Pt. II, pp. 423-38, bibl. 11, and *Proc. Inst. elect. Engnrs*, 1949, **96**, Pt. II, No. 50, pp. 312-15.

For authors' summary of their paper see *H.A.*, 19: 807. This reprint includes also the discussion on the paper and its subject which took place at Newcastle-on-Tyne in February, 1948.

Soil problems.

(*See also* 3530, 3593.)

2684. JACKS, G. V.
Soil conservation prospects.
Research, 1949, **2**: 348-52.

The problem of soil erosion is dealt with from a social and economic standpoint, and is shown to lie not so much in devising effective methods of erosion control as in fitting these methods into the existing agricultural systems. In the U.S.A. the problem is being tackled by the establishment of soil conservation districts, in which compulsory control of land utilization is in the hands of the land users themselves, who have the benefit of technical assistance and advice from the Federal Soil Conservation Service. This system is compared with the large-scale Russian programme for the conservation of 300,000,000 acres of steppe land by the systematic planting of shelter belts, construction of reservoirs and change of crop rotations, enforced by decree.—Commonwealth Bureau of Soil Science, Rothamsted.

2685. BROWN, L. N.
Contour planting of unirrigated perennials.
Circ. Calif. agric. ext. Serv. **152**, 1949, pp. 16, illus.

Brief but clear directions to farmers on when contour planting is necessary, how to lay it out, and how to manage the soil.

2686. MOSOLOVA, L. V.
Change in soil structure in the various parts of a slope in relation to degree of erosion.
[Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk. S.S.S.R., 1949, No. 5, pp. 15-21, bibl. 9.

As a result of erosion, the different parts of a slope supply, in different degrees, the nutrient substances necessary for normal growth and development of plants. The amount of water-resisting aggregates varies considerably in the different parts of the slope: it is greatest in the lowest part, least in the middle (eroded) part. Plant-cover is a protection against the destruction of the soil structure. In applying manures to the slope it is necessary to consider the degree of soil erosion in relation to the parts of the slope, so as to select the most suitable form and amounts of fertilizers. The basic means of controlling water erosion should include the application of a rational plant rotation and the planting of soil-protecting trees on the watershed.

2687. REE, W. O., AND PALMER, V. J.
Flow of water in channels protected by vegetative linings.
Tech. Bull. U.S. Dep. Agric. **967**, 1949, pp. 115, bibl. 11, illus.

This publication presents the results of a study made at an outdoor hydraulic laboratory near Spartanburg, S.C., concerned principally with the effects of vegetal linings on the capacity and stability of small water channels. Plants used for lining the channels included numerous grasses, lespedeza and kudzu.

2688. COLMAN, E. A., AND HENDRIX, T. M.
The fiberglas electrical soil-moisture instrument.
Soil Sci., 1949, **67**: 425-38, bibl. 7.

The soil-moisture instrument described consists of two parts: the soil unit, which includes a monel screen fiberglas-cloth sandwich sensitive to soil moisture and a thermistor for temperature detection; and a meter unit, which is a battery-powered alternating current ohmmeter. The soil unit is intended to be buried permanently at the point where moisture measurement

is required. The meter unit is portable and is used to measure the electrical resistance of those elements of the soil unit with which soil moisture and temperature can be determined.—California Forest and Range Experiment Station.

2689. RICHARDS, L. A.
Methods of measuring soil moisture tension.
Soil Sci., 1949, **68**: 95-112, bibl. 79.

References are given to papers dealing with the development and construction of tensiometers for measuring soil moisture. Typical moisture retention curves for a number of soils are given at soil moisture tension values up to 100 atmospheres. Methods for making moisture retention measurements at known soil moisture tension are reviewed, and the relation of such measurements to the field moisture properties of soils is discussed.

2690. MESTRE ARTIGAS, C., AND MESTRES JANÉ, A.
Aportacion al estudio de la fertilización del suelo por medio de hormigueros. **(Increasing soil fertility by the use of "ant-hill" bonfires.)**
Bol. Inst. Invest. Agron. Madrid, 1949, **9**: 20: 125-63.

In view of the present scarcity of manures in Spain the authors studied a method which consisted in the burning of weeds and plant refuse mixed with earth and the spreading of the ashes on the soil. Trials were made in the field and in pot cultures. The method is described.

Manuring and nutrition.

(*See also* 2709n, o, p.)

2691. SWANSON, C. L. W.
Preparation and use of composts, night soil, green manures, and unusual fertilizing materials in Japan.
Agron. J., 1949, **41**: 275-82, bibl. 11, illus.

The relative importance of various organic manures in Japanese agriculture, and their composition and efficiency are discussed. Methods of making composts are described, and information is given on the storage and application of night soil. A table shows the recommended rates of application of night soil and compost to various crops, including mulberry, melon, white potato, sweet potato, apple, orange, leafy vegetables and root vegetables.

2692. ROWAAN, P. A.
Stadsvuilcompost als meststof. **(Town refuse as manure.)**
Maandbl. Landbouwvoorld, 1949, **6**: 190-4, bibl. 2.

The nutritional value of town refuse composts, in respect of P, K and Mg, and the residual value of these elements in the year after application was determined in pot experiments at the Agricultural Experiment Station and Institute of Soil Science, Groningen. The action of the nitrogen and copper content is also briefly considered.

2693. THOMAS, W. D. E.
Radioactive isotopes—an introduction to their properties and applications to plant nutritional studies.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 114-23.

A simplified description of atom structure is given, leading to the term "radioactive isotope". Some of the properties of the principal radiations emitted by radioactive elements are discussed. The principles underlying the qualitative and quantitative measurement of radioactivity are indicated, and the Geiger Muller Counter Method outlined. The application of radioactive tracer technique to plant nutritional studies is [lucidly] illustrated by means of a simple example. [Author's summary.]

2694. WADLEIGH, C. H.
Mineral nutrition of plants.
Ann. Rev. Biochem., 1949, **18**: 655-78, bibl. 102.

The literature published from October, 1947, to October, 1948, is reviewed under the following headlines: Availability of absorbed ions, intake and accumulation of ions, physiological role of the nutrient elements, mineral content of plants in relation to growth responses, experimental design.

2695. STILES, W.
Plant physiology.
Sci. Progr., 1949, **37**: 312-18.

In the section, Recent Advances in Science, 14 papers on the mineral nutrition of plants are briefly reviewed.

2696. MIKKELSEN, D. S., AND TOTH, S. J.
Tissue-testing kit for field determination of the magnesium status of plants.
Agron. J., 1949, **41**: 379-82, bibl. 7, illus.

The construction, equipment and use of this tissue-testing apparatus, devised by the New Jersey Agricultural Experiment Station, are described in detail. It consists of general laboratory equipment, with the addition of a glass tissue grinder, and can be used in the field by farmers and extension workers. Weighing of samples is eliminated.

Glass and glasshouses.

(*See also* 2653, 3123, 3366, 3527.)

2697. MINISTRY OF FUEL AND POWER.
The glasshouse boiler.
Agriculture, 1949, **56**: 270-2, bibl. 2.

A practical article indicating some ways in which the cost of heating glasshouses may be reduced without substantially increasing other expenses.

2698. ANON.
Water—drip by drip.
Fruitgrower, 1949, **108**: 259, illus.

A cucumber grower's views on the merits of a new, patented, automatic, trickle irrigation system for glasshouses which waters each plant individually at ground level. A water-warming device and a liquid fertilizer injector can be incorporated in the equipment.

2699. ANON.
Die neue Tegtmeier-Düse. **(The new Tegtmeier nozzle.)**
Gärtnermeister, 1949, **52**: 203-4.

An illustrated description is given of a new type of spray nozzle for the irrigation of greenhouses, which can be adjusted to produce a fine mist, provided a minimum pressure of 2 atmospheres is available. Nozzles should be installed at 2·5 m. apart at a height

of 2·5 m., but in cucumber houses they are better fixed to the roof directly above the beds.

2700. SEELEY, J. G.
Fertilizer movement and application for automatic and surface watering.
Flor. Exch., 1949, **112**: 24: 15.
The nutrient distribution in greenhouse soils varies with the method of watering. In soils watered automatically from below, a high concentration of salts may accumulate on the surface. These may be leached out by occasional waterings or by flooding from below. As there is less loss of fertilizer by constant water level watering, only half as much need be applied as when surface watering at 1 in. capillary tension. Methods and rates of application are discussed.—Cornell University.

2701. ANDRÉN, F.
Ett par fall av kloratskada i växthus. **(Cases of chlorate injury to glasshouse plants.)**
Växtskyddsnotiser, 1949, No. 3, pp. 7-9.
In an earlier paper attention was drawn to the danger involved in using sodium chlorate herbicides in the immediate neighbourhood of glasshouses (*H.A.*, 18: 1587). In the meantime it has been shown that the presence of sodium chlorate in the wood-proofing material may be a further cause of injury to glasshouse plants. In one case, where cucumbers developed symptoms reminiscent of blotch, the trouble was traced back to the practice of directing the jet of water on to the roof, where minute amounts of the toxic agent went into solution, and thence found their way to the beds below. It is estimated that it takes two months for the symptoms to become manifest, where only traces of the poison are present. Cineraria has been found particularly susceptible to sodium chlorate poisoning.

2702. PRITCHARD, A. E.
California greenhouse pests and their control.
Bull. Calif. agric. Exp. Stat. **713,** 1949, pp. 71, bibl. 7, illus.
The four chapters are on (1) greenhouse pests (treated individually), (2) methods of control (biological control, heat treatment, chemical control), (3) the insecticides (including the recently introduced organic phosphates, organic thiocyanates, and selenium compounds) and (4) methods for applying insecticides (dusts, sprays, fogs, liquid-gas aerosols, smokes, gaseous fumigation, soil treatment, baits).

2703. EKSTRAND, H. [PALM, B.].
Parasitära grönalger på växthuskulturer. **(Parasitic green algae on glasshouse plants.)**
Växtskyddsnotiser, 1949, No. 1, pp. 13-14.
The article is a brief report of a paper by B. Palm in *Trädsgårdsvärlden*, 1948, No. 6, discussing a disease of *Anthurium* caused by an alga of the genus *Phyllobium*. Ekstrand recalls a case of a *Cephaleuros* sp. parasitic on *Poinsettia pulcherrima*.

2704. FOX WILSON, G.
Recent developments in glasshouse fumigation.
J. roy. hort. Soc., 1949, **74**: 444-51, bibl. 11, illus.
The principles, advantages and disadvantages of fumigation with azobenzene, BHC and DDT by means of smoke generators, aerosols and continuous flow aerosols, all of which have undergone tests at Wisley during the past 3 years.

2705. MINISTRY OF AGRICULTURE, LONDON.
Crop production in frames and cloches.
Bull. Minist. Agric. Lond. **65,** 1948, pp. 51, 22 plates, 2s. 6d.
The new edition of this bulletin, brought out only 16 months after the last one (see *H.A.*, 17: 2232), contains a revised and considerably improved account of cloche cultivation. As before, the text deals almost exclusively with the barn type of continuous cloche, but the previously recommended plan for strip cultivation has been modified to allow the use of strips 6 ft. instead of 5 ft. wide, thus leaving a wider pathway, and to allow blocks of 8 ft. instead of 2 ft. wide for cloche-stacking. This spacing has been found essential in commercial practice to permit ease of working and minimize breakages. A further system of strip cropping is suggested, and the range of crops recommended as suitable for cloche cultivation has been extended to include ridge cucumbers, melons, runner beans, beet and strawberries. Recognition of the labour problem, always disproportionate in cloche cultivation, may account for the changed and more acceptable verdict in favour of mechanical cultivation in a strip cropping system. This edition contains 4 additional plates, illustrating the system of strip cropping with barn cloches, and also showing the structure and unit lay-out of a large type of cloche with a rigid metal framework. The only alteration to other sections of the bulletin is the addition of a figure demonstrating an efficient and very simple method of securing Dutch lights.

2706. BROWN, P. H.
Crop production with Dutch lights in Yorkshire.
N.A.A.S. Quart. Rev., 1949, No. 5, pp. 43-5.
A short account of the development of this industry in East Yorkshire showing how experience in that area laid the foundations of a successful horticultural industry, the beginning of which was marked by the introduction of Dutch lights in the early 1930s. The imposition of import duties and the arrival of Dutch "settlers" stimulated development. "From the 200 acres or so of 'Dutch glass' it has recently been estimated that some 600,000 crates of early lettuce, 3,000 tons of tomatoes, 2,250 tons of cucumbers and 200,000 melons are produced annually."

2707. ANON.
Neuerung bei der Pflanzenanzucht. **(A plastic cloche.)**
Tech. Bauern. Gärtner, 1949, 25th April, p. 85.
The cloche described is made of a plastic material which is light and permeable to ultraviolet rays. It is claimed to have a life of about 5 years. O.J.

2708. ANON.
Preventing frost in cold frames.
Market Gr. J., 1949, **78**: 4: 22.
A note on the use of water sprays to prevent frost in cold frames. The work has been done at the New York Experiment Station, Geneva.

Noted.

2709.

a AMERICAN POTASH INSTITUTE.
List of references to boron literature reviewed July-September, 1947.
Mimeo. Amer. Pot. Inst. **B-43,** 1949, pp. 6.

b BAKER, G. A., AND HANNA, G. C.
Transformation of split-plot yield data to improve analysis of variance.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 273-5, bibl. 4.

c BALCHIN, W. G. V.
Recent advances in the study of microclimatology.
Brit. Sci. News, 1949, **2**: 271-4, bibl. 19, illus.

d BENNET-CLARK, T. A.
Organic acids of plants.
Ann. Rev. Biochem., 1949, **18**: 639-54, bibl. 88.
Covers the period 1940-48.

e CLOTHIER, G. E.
Rainfall at Long Ashton, 1914 to 1948.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 241-7.

f DAVIS, G. N., AND CUNEO, C.
A thresher for small lots of seed.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 291-3, illus.

g DUFRÉNOY, J.
Les oligoéléments et particulièrement l'action du bore et phénomènes respiratoires. **(Trace elements and the rôle of boron in the respiratory process.)**
Rev. hort. Paris, 1949, **121**: 78-9, bibl. 4.
Note on recent work.

h EKMAN, P., AND LUNDELL, K.
The determination of cobalt and copper in botanical material.
Ann. roy. agric. Coll. Sweden, 1949, **16**: 531-44, bibl. 16.

i EVANS, G. C.
Transpiration and water uptake of cut shoots. A note on an apparatus for simultaneous measurements in the field.
J. Ecol., 1949, **37**: 171-3, illus.

j GALSTON, A. W., AND HAND, M. E.
Adenine as a growth factor for etiolated peas and its relation to the thermal inactivation of growth.
Arch. Biochem., 1949, **22**: 434-43, bibl. 17.

k GOEDEWAAGEN, M. A. J.
De methoden, die aan het Landbouwproefstation en Bodemkundig Instituut T.N.O. te Groningen bij het wortelonderzoek op bouw-en grasland in gebruik zijn. **(The methods used at the Agricultural Experiment Station and Soil Science Institute T.N.O. Groningen for root investigation in cultivated and grass land.)**
Publ. (out of series) LandbProefst. bodemk. Inst. T.N.O. Groningen, 1948, pp. 11, bibl. 4, illus.

l HARDER, R., AND GÜMMER, G.
Über die Blütenbildung von *Kalanchoë blossfeldiana* in verschiedenen Licht-Dunkel-Rhythmen. **(Flower formation in *K. blossfeldiana* in different rhythms of light and darkness.)**
Planta, 1949, **37**: 12-47, bibl. 8.

m HAVINGA, E., AND NIVARD, R. J. F.
Ultraviolet absorption spectra and stereochemical structure of plant growth substances of the cis-cinnamic acid type and of stilboestrol.
Reprinted from *Rec. Trav. chim. Pays-Bas*, 1948, **67**: 846-54, bibl. 11.

n KORTLEVEN, J.
Richtlijnen van het compostonderzoek. **(Lines of compost research.)**
Reprint from *T.N.O.-nieuws*, 1949, Jg. **4**, Nr. 35, pp. 8.
At the Agricultural Experiment Station and Soil Science Institute, Groningen.

o MCCALLA, A. G.
Nitrogenous constituents of plants.
Ann. Rev. Biochem., 1949, **18**: 615-38, bibl. 99.

p MCKEE, H. S.
Review of recent work on nitrogen metabolism.
New Phytol., 1949, **48**: 1-83, bibl. 776.—Div. Fd Pres. Transp. C.S.I.R. Austr.

q MELCHERS, G., AND LANG, A.
Die Physiologie der Blütenbildung. **(The physiology of flower formation.)** [English summary 10 ll.]
Biol. Zbl., 1948, **67**: 105-74, bibl. pp. 5½.

r DE PABLO PARDO, J. C. L. A.
Tipificación de hortalizas. **(Classification of horticultural produce.)**
Circ. Dir. gen. Econ. Com., Minist. Ind. Com. Argentina **1,** 1948, pp. 11.

s STEUBING, L.
Beiträge zur Tauwasseraufnahme höherer Pflanzen. **(The absorption of dew by higher plants.)** [English summary 7 ll.]
Biol. Zbl., 1949, **68**: 252-9, bibl. 22.

t STREET, H. E.
Experimental methods available for the study of the nitrogen metabolism of plants. A review of some recent advances.
New Phytol., 1949, **48**: 84-96, bibl. 211.

u TIHOV, G. A.
Spectral analysis and fluorescence of the green parts and flowers of plants. [Russian.]
Priroda (Nature), 1949, No. 6, pp. 3-13.

v VELDSTRA, H., AND HAVINGA, E.
Untersuchungen über pflanzliche Wuchsstoffe. VII. Über Struktur und Wirkungsmechanismus der pflanzlichen Wuchs- und Hemmstoffe. **(A study of plant growth substances. VII. The structure and mechanism of substances promoting and inhibiting plant growth.)**
Reprinted from *Rec. Trav. chim. Pays-Bas*, 1943, **62**: 841-52, bibl. 19 [received 1949].

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3517, 3524, 3528, 3539, 3560, 3565, 3571, 3573, 3577.)

2710. STORRIE, D. L.
Apples and pears in Scotland.
The Fruit Year Book 1949, R.H.S. Lond., pp. 28-35.

The author discusses old and new orchard and garden varieties. The problems of apple- and pear-growing in Scotland are similar to those in England, much depending on the selection of the right varieties for the particular locality. The author prefers Malling I as an all-round rootstock for apples in Scotland. Stronger stocks such as XII and XVI are used where anchorage is of prime importance. Malling II is suitable for cordons, trained trees, and dwarf pyramids. Malling IX cannot be generally recommended. For pears, Quince A is the most popular rootstock at present, Quince C being rather too weak for general use in Scotland.

2711. PALMER, R. C.
Fruit growing under irrigation in British Columbia.
The Fruit Year Book 1949, R.H.S. Lond., pp. 86-90, illus.

Fruit growing in the semi-arid Okanagan and adjacent valleys of southern British Columbia is described under (1) climate and soil, (2) irrigation methods, (3) cover crops and fertilizers, (4) varieties and rootstocks, (5) pruning and thinning, (6) sprays and spray machinery, (7) harvesting procedure, packing and storage, (8) processing and by-products, and (9) marketing procedure.—Dominion Experimental Station, Summerland, B.C.

2712. HUDSON, J. P.
Tree fruits in New Zealand's homes and orchards.
The Fruit Year Book 1949, R.H.S. Lond., pp. 67-78, illus.

The author describes general fruit tree management, varieties of apple grown, other tree fruits, soft fruits and nuts, subtropical fruits. With regard to apple rootstocks he writes, " It now seems that E.M. I is no more vigorous than Northern Spy, but E.M. XII and XVI have proved much superior, producing better trees and deeper root systems. They are being used in new plantings and also in existing orchards when replanting gaps where trees on Spy have died out. E.M. I and E.M. XIII are recommended as semi-dwarfing stocks."

2713. GAYNER, F. C. H.
The amateur fruit-grower in South Africa.
The Fruit Year Book 1949, R.H.S. Lond., pp. 79-85, illus.

The climates of the various fruitgrowing regions in South Africa are described. The most fundamental difference between English and South African fruit gardens is one of climate. Most of South Africa has either a Mediterranean or a subtropical climate, so that those fruits which are adapted to the temperate zones are only partially represented here, but their absence is compensated for by the presence of all those fruits which can be grown in a relatively frost-free climate. Apricots, peaches, figs, grapes, and loquats are found in most gardens. The true subtropical fruits are not found so often in amateurs' gardens, but oranges, lemons, tangerines, bananas, guavas, avocados, custard apples, mangoes, litchis, grenadillas and papaws are to be found in suitable areas. The rootstocks in use do not differ much from those in England except that their relative importance is altered. Apples are usually worked on either Northern Spy or " Free " stock. The vegetatively propagated series of East Malling rootstocks have not proved successful.

2714. JARDINE, F. A. L.
Horticultural districts of Queensland. 1. The Granite Belt.
Qd agric. J., 1949, **69**: 78-83, illus.

Brief details are given of climate, soils, acreage and production of vegetables and fruits in this belt, of which Stanthorpe is the main business centre.

2715. READ, F. M.
Fruit growing in Victoria, Australia.
The Fruit Year Book 1949, R.H.S. Lond., pp. 63-6, illus.

Discusses fruitgrowing areas and varieties grown. It is stated that " The berry fruits do not present a very rosy picture. Virus diseases have wiped out such high-quality strawberries as Melba, and we now grow rather poor-quality tolerant varieties, such as Ettersburg, which is of the same type as Huxley's Giant."

2716. AMIZET, L.
Aperçu de certains aspects de l'arboriculture californienne actuelle. **(Fruit growing in California.)**
Fruits et Prim., 1949, **19**: 189-200, bibl. 10, 229-33.

The first part deals chiefly with almonds, the second with apricots.

2717. MONTGOMERY, H. B. S.
The experimental plantations at East Malling.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 119-23.

A list of experimental plots (with their crops) on the Research Station,* with a plan of the Station and an aerial photograph of the Bradbourne estate.

Breeding and varieties.

(*See also* 2644, 2808d, e, k, l, 3542.)

2718. TYDEMAN, H. M.
In search of new fruits.
The Fruit Year Book 1949, R.H.S. Lond., pp. 13-19, illus.

An account of the fruit breeding work that is being carried out in Scandinavia, based on observations made during a tour in 1948, with a map showing the itinerary. —East Malling Research Station.

2719. EVREINOFF, V. A.
I. V. Miciurin e i suoi lavori di ibridazione. **(Mičurin's work of hybridization.)**
Humus, 1949, **5**: 2: 16-17.

A short, clear outline of the main features of the

* About 35 miles S.E. of London.

methods used by Mičurin which enabled him in the course of 60 years to obtain several hundreds of new varieties of apple, pear, apricot, plum, cherry, almond and " cerapad " [*Prunus cerasus* × *Prunus padus*] suitable for growth much farther north than had ever been possible before. For most of his lifetime he suffered from derision and lack of help. At the end of it the merits of his work were recognized, and now a large research station is busy working on and developing his results.

2720. URE, C. R.
Requirements in Prairie fruit varieties.
[*Mimeo.*] *Rep. Proc. 5th annu. Meet. West Canadian Soc. Hort.*, 1949, pp. 25-35.
This paper attempts to answer the question, " What are we looking for in these varieties ? " The following aspects of the problem are discussed: climatic considerations [in Canadian prairies], hardiness, new sources of breeding material, tree framework and stature, early maturity of wood and fruit, improving fruit quality, drought tolerance, resistance to lime-induced chlorosis, insects and diseases, the need for more genetical knowledge.

2721. HUNTER, A. W. S.
Progress in breeding hardy fruits [in Canada].
[*Mimeo.*] *Rep. Proc. 5th annu. Meet. West Canadian Soc. Hort.*, 1949, pp. 21-5.
A discussion of some points bearing on the progress " that will be made " in breeding hardy fruits. With regard to devising artificial tests for hardiness, it is pointed out that this complicated task is one for a concerted effort on the part of specialists whose sole responsibility is the study of winter hardiness.

2722. TYDEMAN, H. M.
A new apple variety: Tydeman's Late Orange, formerly called Tydeman's Late Cox.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 75-6.
A new apple variety, Tydeman's Late Orange, from a cross between Laxton's Superb and Cox's Orange Pippin, is described. It is recommended as a dessert apple to follow Cox's Orange Pippin. The trees are similar in many characters to those of Cox's Orange, but are more vigorous.

2723. BARKER, B. T. P.
The cider apples of England.
The Fruit Year Book 1949, R.H.S. Lond., pp. 55-9.
The characters and qualities of cider apples are described and lists are given of varieties valuable for general and for local planting in England. Some cider apples recommended for garden decoration are mentioned.

2724. RIERA, F. J., AND VLOEBERGH, A.
Las formas geográficas de *Pyrus amygdaliformis* (Willd. y Vill.). **(The geographical forms of *Pyrus amygdaliformis* Willd. and Vill.)**
Anal. Esc. Perit. agric. Barcelona, 1948, 7: 87-96, bibl. 22.
A description of *Pyrus amygdaliformis* with illustrations of its habit and fruit, its geographical distribution and varieties. It is recommended as a rootstock for pears, when trees are required of medium size, coming into fruiting earlier than those on *Pyrus communis*.

2725. DUGGAN, J. B.
The order and period of blossoming in sweet cherry varieties.
J. hort. Sci., 1948,* **24**: 189-91, bibl. 2.
The order and the length of blossoming of 26 varieties of sweet cherries recorded [in Kent] during the four seasons 1938-1941 are given. The length of the blossoming period varied during the four years from 12 days to 22 days. The order of flowering of the varieties recorded was very consistent. [Author's summary.]

2726. MANN, A. J., AND KEANE, F. W. L.
The Star cherry.
Fruit Var. hort. Dig., 1949, **4**: 71-2.
Star is an open-pollinated seedling of Deacon selected at the Summerland Experimental Station, B.C. It has the good qualities of Bing but it is at least one week earlier. The tree is reasonably vigorous and it has proved hardy at Summerland in a moderately severe winter. An illustrated description of the variety is given.

2727. GRUBB, N. H.
Cherries for the garden.
The Fruit Year Book 1949, R.H.S. Lond., pp. 119-27.
The difficulties of growing sweet cherries in the English garden (length of time in coming into bearing, and large tree size), and the possibility of raising trees on dwarfing rootstocks, are discussed. Some 30 varieties are briefly described. Reference is made to investigations on the control of bacterial canker at East Malling.

2728. ŠAĬTAN, I. M.
The importance of Mao-Tha-Ora in peach breeding. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, p. 60.
In 1929 seeds of Mao-Tha-Ora (*Amygdalus kansuensis*) were brought from Manchuria to Kiev for hybridization with the cultivated peach *Amygdalus* [*Prunus*] *persicae*. In appearance Mao-Tha-Ora is very similar to the peach but it is more resistant to frost and drought; its fruit is more downy, its sugar content about the same but the acidity is higher. It was crossed with the variety Auguste Kaščenko and the hybrid seedlings proved to be more vigorous, more resistant to frost and drought and to have a higher yield than Auguste. Their fruits were about the same size as those of Auguste, their sugar content rather lower and acidity about the same. Two seedlings have been selected for the flavour of their fruit.

2729. POTTER, J. M. S.
Plums.
The Fruit Year Book 1949, R.H.S. Lond., pp. 127-33.
The author advises only dessert plums for English garden cultivation, and their entire omission from gardens specially liable to frost injury. Notes are given on pruning, manuring and pollination.

* Appeared August, 1949.

2730. Crane, M. B.
The origin of the garden plum.
The Fruit Year Book 1949, R.H.S. Lond., pp. 11-12, illus.
Cytological investigations and breeding experiments with species and varieties of *Prunus* have all led to the conclusion that the cherry plum *P. cerasifera* with 16 chromosomes, and the sloe *P. spinosa* with 32, are the parental species of *P. domestica* with 48 chromosomes.—John Innes Horticultural Institution.

2731. (Jones, R. N.)
Promising new fig.
Fruit World, Melbourne, 1949, **50**: 7: 7.
A description of the new fig variety, Preston Prolific, and a discussion of its origin as a chance seedling.

2732. Müller-Stoll, W. R., and Michael, K.
Untersuchungen über die Eigenschaften der Beeren und Blätter von süssen und bitteren Ebereschen (*Sorbus aucuparia* L.). **(The properties of berries and leaves of sweet and bitter service berry (*S. aucuparia*.)**
Züchter, 1949, **19**: 233-47, bibl. 22.
The sweet service berry variety (var. *moravica*), which is characterized by large berries with a high sugar and ascorbic acid content, has aroused some interest as a source of vitamin C, and a breeding programme has been initiated. The paper presents data on the composition of berries and on leaf characteristics facilitating selection.—Versuchsabt. f. Pflanzenzüchtung Tharandt nr. Dresden.

2733. Di Prima, S.
Primo contributo allo studio biometrico delle varietà d'olivo in Provincia di Bari. **(A preliminary contribution to the biometrical study of olive varieties in the Province of Bari.)** [English summary 10 ll.]
Ann. Sper. agrar., 1949, **3**: 457-91, bibl. 34.
The author's observations and measurements of 7 olive varieties in southern Italy enabled him to pick out 3 particular measurements of fruit, leaf and flower by which the identity of the varieties could be established. He considers that further examinations should make it possible to classify and identify existing olive trees.—Staz. agrar. sper. Bari.

Propagation and rootstocks.

(*See also* 2710, 2712, 2727, 3532, 3536, 3547.)

2734. Ministry of Agriculture, London.
Fruit tree raising—rootstocks and propagation.
Bull. Minist. Agric. Lond. **135,** 2nd edition, 1949, pp. 45, illus., 2s.
Apart from certain changes in the pest control recommendations, and the inclusion of DDT in the spraying programme, there is one valuable addition to the first edition of this bulletin [for which see *H.A.*, 16: 1801]. That is a series of excellent photographs, lent by East Malling Research Station, of the growth habit and leaf characters of apple and plum rootstocks, together with a concise description of each as it appears in August. This is intended as an aid to the recognition in the nursery of rootstocks included in the Ministry's Certification Scheme.

2735. Garner, R. J.
Some aspects of propagation research with special reference to fruit trees.
Meded. Dir. Tuinb., 1949, **12**: 390-3, bibl. 6.
The substance of a short address given at Wageningen, in May, 1919, dealing with experience at East Malling, England, regarding source of hardwood cuttings, budding technique, and sweet cherry trees of restricted growth and early cropping.

2736. Garner, R. J., and Hatcher, E. S. J.
Utilization of an ornamental lake for water-table control experiments in relation to vegetative propagation.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 77-80, bibl. 3, illus.
A description of the transformation of the delta of a derelict artificial lake to form a terraced island providing soil depths of 12, 18, 24, 30 inches above the common water-table, for experiments with fruit tree rootstock cuttings and mineral deficiency plant indicators.

2737. Potter, J. M. S.
Grafting without the use of wax or pug.
The Fruit Year Book 1949, R.H.S. Lond., p. 62, illus.
In the method briefly described the ordinary whip and tongue graft is used, but instead of sealing the union and top of the stock with grafting wax or pug, the grafted stock is earthed up with fine soil until only the top inch of the scion is exposed.

2738. Denham, H.
A refinement in rind (crown) grafting technique.
The Fruit Year Book 1949, R.H.S. Lond., pp. 60-2, illus.
The method described is to use " billets ", small lengths of circular section material " snugged in under the raffia ties to bring the back of the stock into close contact with the scion, which has a narrow shaving of its bark removed at each side to expose more of the cambium ".

2739. Prihodjko, N. P.
Budding height. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, p. 65.
A brief note pointing out that the height at which budding is carried out should depend upon the type of soil in which the rootstock is growing. Trials showed that with seedling apples on light sand, sandy loam and black earth the best results were obtained when the buds were inserted at the crown (ground level), but on heavy and clay soils the buds should be inserted at 5-6 cm. above ground level. On heavy soils budding at ground level reduced the " take " to 40%. On such soils the binding material, in contact with the moist soil, absorbs moisture which gets into the bark of the seedling plant and delays union, thus increasing the number of buds killed. Losses are highest in wet years.

2740. Stepanov, S. N.
Hints on budding. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 58-63.
Among hints for Russian conditions are the following:

The material selected for scion wood should be well ripened, and the budding should be carried out when the cambial layers are active. The scion material should not be stored on ice but under conditions of ordinary temperatures, high moisture, and shade. Vertical shoots are generally more vigorous than side shoots and so are a better source of buds. Material should be true to type and from known trees. The time of budding is important; there should be good union before winter. Budding should be completed before the first frost is expected. The advantages of double-budding are discussed.

2741. MORETTINI, A.
I. La potatura di formazione del vaso nell' olivo e nelle piante da frutto. II. Nuove direttive nella tecnica della propagazione dell' olivo. **(I. The pruning of olives and of fruit trees. II. Olive propagation.)**
Reprinted from *Sci. Tecn. Agric. ital.*, 1943, pp. 43 [received 1949].

A lecture on the theory of pruning fruit trees is followed by one on the vexed question of olive propagation, which is considered from an economic standpoint. The author notes that the alternative methods of propagation are by (*a*) grafting on seedlings, (*b*) cuttings, (*c*) suckers, (*d*) ovoli [see *H.A.*, 14: 46]. A consideration of each method leads him to suggest that there can be no hard and fast rule applicable in all cases. He rejects the idea that the ovoli are the product of parasitic action, considering them to be normal, natural growths having the specific function of renewing the growth of both roots and aerial parts of the olive. In his opinion the method of propagation most suitable for the conditions obtaining should be used.

2742. HOCHAPFEL, H.
Verhütung von Keimschädigungen bei Obstsämereien durch Beachtung ihrer physiologischen Eigenart. **(Prevention of damage to the germination capacity of fruit seed during storage.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 73.

The physiology of fruit seed germination is briefly discussed with special reference to the role of amygdalin and the structure of the seed coat. In a moist condition fruit seed is very susceptible to higher temperatures, injury occurring even at 35° C. In dried seed the radicle was found to suffer damage after 6 hours' exposure to 45° C. As a rule, the best temperature for germination is 8° C.; a second rest period will set in if 12° C. is exceeded.

2743. BUDAGOVSKIĬ, V. I.
Improving the quality of the seeds of the wild apple. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 17-21.

The woodland crab apples (*Malus silvestris* L.) are generally used as rootstocks for apples in Russia, but they vary very much in vigour, in resistance to winter injury, drought and diseases, and in their influence on the scions grafted on them. It is pointed out that woodland conditions are very different from those of the open steppe, and woodland trees when planted in the orchard may not conform to the conditions of cultivated ground, particularly with regard to drought and winter frosts. Use, however, may be made of their seeds for raising selected seedlings. The seeds should be taken from healthy, vigorous trees, preferably those isolated in clearings, as being probably more adapted to a continental climate than those in dense woodland. Hybridization is suggested, particularly between the wild crab and the Chinese crab, *Malus* [*Pyrus*] *prunifolia*, in order to obtain seedlings for selection. Selected Chinese crabs not only yield good rootstocks, but they produce fruit suitable for processing.

2744. BELOVA, M. P., AND ELICEEVA, E. V.
Changing the method of obtaining the seed of wild apple and pear. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 21-4.

Around Ostrogozsk to the south of Voronež, U.S.S.R., there are many forms of wild apples and pears which differ in age, vigour, form of head and the disposition of the limbs and branches, colour and structure of the bark, shape and colour of leaves, fertility, time of fruit ripening, the number and quality of the seed, the core, immunity to diseases and pests, length of growing period, etc. Not all forms are suitable as rootstocks, and the difficulty of obtaining uniform material is evident. Some of them, however, reproduce themselves naturally by root suckers, and this helps in selecting more uniform material. Selection from seed should be done with care. The size of the fruit affects the size and quality of the seeds, and the use of seed from large fruit only is advocated.

2745. HAVIS, L., AND GILKESON, A. L.
Starting seedlings of Montmorency cherry.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 216-18, bibl. 1.

When only small numbers are available nutrient agar culture is found preferable to sand and muck. Helpful details of technique are noted.

2746. RODIONOV, A.
A study of the vernalization stage in fruit plants. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 14-16, illus.

During stratification, seeds of fruit plants pass through a stage of vernalization. Seedlings from non-vernalized seeds have a rosette growth and the weak development of the central shoot causes them to grow bushy. The requirements of peach and sand cherry during vernalization are different. The sand cherry passes the vernalization stage in the open during spring. Peach seedlings grown from dry (unstratified) seed do not bear fruit, and for fruit buds to develop they must be subjected to low temperatures. A low temperature during stratification is not the only factor necessary for the germinating of the seed, but it is a condition indispensable for the normal development of the plant.

2747. SAX, K.
The use of *Malus* species for apple rootstocks.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 219-20.

Of various Asiatic species tested at the Arnold Arboretum, Jamaica Plain, Mass., *Malus hupehensis*, *M. toringoides* and *M. sikkimensis* proved apomictic. *M. tschonoskii* also produces very uniform progeny for other reasons. This is probably true also of

M. florentina. Notes are given of the growth of these seedlings both worked with McIntosh and unworked or worked in some cases on one another.

2748. HÜLSMANN, B.
Erste Veredlungsversuche mit Apfelunterlagenklonen aus *Malus baccata*. (Apple rootstock trials with *M. baccata* clones in the nursery.)
Züchter, 1949, **19**: 254-61, bibl. 4.

For the earlier phases of the seedling rootstock selection work, carried out at Berlin-Dahlem, and its object, see *H.A.*, 19: 107, 1791, 1796 and 1797. In his latest paper the author presents detailed records of the nursery behaviour of 36 *M. baccata* clones selected from seedlings of 4 different sources. Again, the rootstocks were worked with 5 varieties and their yield of 2-year-old trees was compared. Four clones gave very high yields, and 12 clones yielded well. Of 19 comparable clones, 8 were found to be extremely vigorous, 6 very vigorous, 3 medium and 2 very dwarfing. With these clones the relation between vigour and yield of saleable trees was less pronounced than with the other seedling rootstocks examined. The investigation was completed in January, 1945.

2749. HARRISS, R. W.
In favour of type I rootstock, the drought has proved its value.
Fruitgrower, 1949, **108**: 255.

A note in defence of the Malling I rootstock (Broad-leaved English Paradise), a stock which has declined in popularity in Britain. The author sets out some of its desirable attributes and claims that it stands up to drought remarkably well.

2750. MAURER, K. J.
Erfahrungen mit Samenspendern. **(Sources of seed for apple rootstocks.)**
Baumschule, 1949, No. 1, p. 42.

The importance of small fruit size is emphasized. Antonowka and Litauer are the best sources, but selection is necessary, since different types of these varieties exist. O.J.

2751. GARNER, R. J.
Rootstock propagation and fruit tree raising.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 132-5, illus.

Attention is drawn to the need for avoiding incompatibilities when propagating pears and plums and suggestions are made to guide nurserymen in modernizing their methods.

2752. TYDEMAN, H. M.
Trials with new quince rootstocks.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 68-74, illus.

Fifteen varieties of quince from the Far East were worked with Conference and Dr. Jules Guyot in 1939. Their behaviour in the nursery is described. The trees of Dr. Jules Guyot were very poor at all stages, but those of Conference were generally healthy, though some remained small on certain rootstocks. The trees on the dwarfing stocks were more productive in relation to their size, up to the end of their ninth year, than the trees on the more vigorous stocks and on Malling A, B and C, although the latter produced a greater actual weight of fruit.

2753. SCHENG, P. J.
Als Bomen "zo maar" sterven. **(Why trees just die.)**
Cult. Hand., 1949, **15**: 274-5, illus.

In discussing why trees sometimes perish without any evident cause, the author describes and illustrates a row of young pear trees on quince rootstocks which were killed by frost. The only tree surviving was one that had become scion-rooted.

2754. HATCHER, E. S. J., AND GARNER, R. J.
Aspects of rootstock propagation. I. The influence of date of planting on the establishment and growth of Myrobalan B plum hardwood cuttings.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 92-8, bibl. 4.

Hedge shoots of Myrobalan B rooted satisfactorily when planted from mid-October to early February. The amount of growth made was strongly correlated with time of planting, most growth resulting from autumn planting. A growth substance applied was too strong; it had a stimulatory action but an overall deleterious effect, most severe in the pre- and post-dormancy states of the cuttings.

2755. JAIVENOIS, A.
Parmi les sujets porte-greffes du prunier: le Myrobolan Wibaut ou Myrobolan de Lesdain. **(Plum rootstocks, the Wibaut or Lesdain Myrobalan.)**
Courr. hort., 1949, **11**: 240-1, illus.

An account of the Wibaut Myrobalan which is distributed from nurseries in the south of the province of Hainaut, Belgium. It was introduced in 1910 by M. A. Wibaut, a nurseryman of Lesdain who selected it from Myrobalan seedlings received from the south of France. It has a smooth, upright, rigid stem, capable of maintaining a heavy branch system, and is recommended for high-working with plum varieties. It compares favourably with other plum rootstock varieties.

2756. SIBORENKO, M. F., AND KASJJANENKO, A. I.
Rootstocks for sweet cherries on sandy soils. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 24-6.

The observations recorded were made at the Melitopol (southern Ukraine) Horticultural Station. The difference in the root systems of Mahaleb, wild sweet cherry, and acid cherry, with sweet cherry as scion are shown. Data (size of tree, girth of stem, and yield) for two varieties of sweet cherry on these three rootstocks are tabulated. The results indicate that the trees on Mahaleb and sweet cherry (particularly on the former) were more vigorous and fruitful than those on acid cherry.

Pollination.

(*See also* 3591.)

2757. ALMEIDA, C. R., M. DE.
Do estudo da improdutividade das fruteiras nas suas relações com o fomento arborícola. **(Infertility in fruit trees in relation to new plantings.)**
An. Inst. sup. Agron. Lisboa, 1943, **14**: 201-10 [received 1949].

The author discusses the necessity for cross pollination in the pear variety Rocha and in almonds. With regard to pears he gives the date of fruit set following the pollination of Rocha pear with seven other varieties. The highest percentage set was given by the varieties Carapinheira, Marquezinha, and Beurré Superfin; of these, however, Marquezinha is unsuitable for pollinating Rocha, since it flowers later. Doyenné du Comice and Beurré Hardy, though giving a lower percentage set, may be adequate, and they have other advantages which recommend them for cultivation. Suitable crossings for almond varieties are given.

2758. PRESTON, A. P.
An observation on apple blossom morphology in relation to visits from honey bees (*Apis mellifera*).
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 64-7, bibl. 7, illus.

Observations, showing that Bramley's Seedling is visited by honey bees less than some other varieties, were confirmed by actual honey bee counts on Bramley's Seedling and Worcester Pearmain. Honey bees appear to reach the floral nectaries of Bramley's Seedling with difficulty, and measurements show the conformation of the stamens to be primarily responsible. This variety has longer and closer stamens than Cox's Orange Pippin, Worcester Pearmain or Lord Derby. Aspects of pollination are discussed.

2759. SINGH, S., AND BOYNTON, D.
Viability of apple pollen in pollen pellets of honeybees.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 148-52.

These trials at Ithaca indicate that, if pollen collected from pollen traps inserted at the entrance to bee colonies is to be used for commercial pollination, it will be necessary to remove the pellets from the traps after short intervals and to devise special treatment of the pellets to prevent the decreased viability which quickly occurs.

2760. KREMER, J. C.
Germination tests of the viability of apple pollen gathered in pellets.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 153-7, bibl. 3.

A discussion of experiments in technique at East Lansing.

2761. GRUBB, N. H.
A seasonal influence on cherry pollination and ripening.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, p. 131.

The effect of the different meteorological conditions in 1947 and 1948 on the pollination and ripening of Bradbourne Black and Flamentiner.

2762. MINISTRY OF AGRICULTURE, LONDON.
Migratory beekeeping.
Adv. Leafl. N.A.A.S. **344**, 1949, pp. 4.

The system of moving bees during the active season to productive sources of forage can benefit both grower and beekeeper. Advice is given on choice of crop, influence of soil type on nectar secretion, selection of sites for temporary apiaries, management, moving the bees, and the precautions to be taken against spray dangers.

Growth and nutrition.

(*See also* 2668, 2669, 2671.)

2763. SCHAD, C., BIDABE, B., AND CHIRENT, G.
Contribution à l'étude des caractères de la fleur de pommier. **(A study of the characters of the apple flower.)**
C.R. Acad. Agric. Fr., 1949, **35**: 307-9.

Variations previously observed in the structure of apple flowers are mentioned, and an account is then given of the variation in floral form observed at the Agricultural Research Centre for Central France, where a collection of French and foreign apple varieties has been assembled.

2764. IGNATIUS, J. G. W., AND DE WIT, W.
Onderzoek naar de invloed van het weer op de appel- en perenoogst. **(An investigation into the effect of the weather on apple and pear crops.)** [English summary ¼ p.]
Landbouwk. Tijdschr., 1949, **61**: 153-67, bibl. 16.

Results are given of an investigation into the effect of weather factors on the annual variation in yields of apples and pears in the Utrecht fruit district over the periods 1923-42 and 1933-42 respectively. The possibility is demonstrated of calculating the size of crop before harvest by means of a regression equation, which introduces the following independent variants: (1) the difference in rainfall between 2 critical periods (12/7-10/8 and 10/6-30/6) in the year preceding harvest, (2) the minimum temperature during blossoming, and (3) the total number of hours of sunshine after blossoming during the period, 20/5-10/6 for apples, and 1/5-10/6 for pears. Of these 3 factors, temperature and sunshine appeared to have the greatest influence. Their effect is interpreted in relation to dates of flower bud and fruit formation. The equations gave estimates of crop yields that approximated satisfactorily to the actual yields in apples. In pears, however, the results were less good. This was due to uncertainty about the exact date of flower initiation, which made the choice of critical periods for weather recording somewhat arbitrary.

2765. BRADFORD, F. C.
Growth characteristics of certain cider apple varieties and crab apples.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 202-4.

Five crabs, the rest cider apples from England or France, mainly bitter-sweets.—Glenn Dale, Md.

2766. HARLEY, C. P., MOON, H. H., AND REGEIMBAL, L. O.
A study of correlation between growth and certain nutrient reserves in young apple trees.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 1-5, bibl. 2.

Young Stayman Winesap apple trees were grown for two seasons in sand culture solutions, N, K and Mg at three levels being supplied the first year but only distilled water the second. Between the seasons the

trees were cut back to 60 cm. No significant growth response occurred in 1948 to varying amounts of K or Mg when N was the limiting factor in 1947. Where N was not deficient, greater growth due to increased Mg was obtained only when K was not limiting.—Beltsville, Md.

2767. SINGH, L. B.
Studies in biennial bearing. IV. Bud-rubbing, blossom-thinning and defoliation as possible control measures.
J. hort. Sci., 1948,* **24**: 159-77, bibl. 6, illus.

The results of various treatments designed to break the biennial rhythm are described. These were carried out on trees of known biennial habit, some in their "off" phase and some in the "on". The main object of the treatment in the "off" year was to lessen the formation of fruit buds by defoliation, in different degrees and at varying times, and so prevent excessive cropping the following year. The following abstract is from the author's summary. Partial defoliation of Early Victoria apple, at certain periods, reduced new shoot growth but had no significant effect on either trunk thickening or fruit bud formation. Rather more severe defoliation of Miller's Seedling apple had similar effects on shoot and trunk thickening. A preliminary trial of defoliation by chemical sprays, using sodium chlorate, copper sulphate, tar oil and lime-sulphur, at various concentrations, showed that all degrees of leaf destruction up to 100% can be obtained. Certain sprays also checked fruit bud formation. Sodium chlorate, even at 0·05%, scorched almost all the leaves and entirely prevented fruit bud formation. Lime-sulphur had practically no effect. Tar oil and copper sulphate were intermediate. Bud-rubbing and blossom-thinning, resulting in removal of about 80% of the blossoms, on sample branches, improved their vegetative vigour, particularly in relation to leaf area. Bud-rubbing was more effective than blossom-thinning in this respect. The crop on the bud-rubbed and blossom-thinned branches was much reduced in the year of treatment, but in the following year the treated branches produced a normal crop of about a bushel (40 lb.) per branch, in what would normally have been an "off" year. It is suggested that by the use of such treatments, or modifications of them, a proper balance between growth and cropping can be established and satisfactory crops of good quality fruit maintained from year to year. [See *H.A.*, 6: 268 and 19: 122.]

2768. DERMINE, E.
Étude de quelques phénomènes de la maturation des fruits. **(A study of phenomena associated with the ripening of fruit.)**
Fruit belge, 1949, **17**: 129-37, illus.

The tests described are an attempt to follow the changes that take place during the ripening process in certain varieties of pear and apple, in the hope of discovering a criterion of maturity. During the weeks which immediately preceded the expected normal date of picking, fruits of different varieties were taken at regular intervals and immediately examined for firmness, coloration of flesh when treated with iodine, sugar content, and acidity. The results are described and those of the iodine tests illustrated. The conclusion drawn is that the sugar-content test seems to be the only one that will give an indication of the best time for fruit picking.

* Appeared August, 1949.

2769. JUDKINS, W. P.
The relationship of leaf color, nitrogen and rainfall to the growth of young peach trees.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 29-36, bibl. 13.

A description is given of the successful use of a photo-electric reflection meter for measuring leaf colour, and its use for measuring fruit colour also is advocated. Leaf colour was correlated with leaf nitrogen in 1-year-old peach trees on Wooster silt loam soil and both were correlated positively with increased circumferences of 1-year-old peach trees growing in gravel nutrient solutions. On a deep silt loam soil, moisture proved more important than nitrogen. In seasons where moisture was not a limiting factor Halehaven peaches grew as well under sod as under a cultivation-cover crop system during their first 3 years in the orchard. The use of nitrogen fertilizer in excess of 0·10 lb. per year of tree age did not result in increased growth.

2770. RODRIGUES, A.
O crescimento do tronco nas plantas novas da forma *Branca* de *Olea europaea* L. **(Stem growth in new plants of the form *branca* of *Olea europaea* L.)** [English summary 5 pp.]
Agron. lusit., 1946, **8**: 213-64, bibl. 7, illus. [received 1949].

A biometric study of the modifications in the stem structure, in relation to the development of the branches, of olive seedlings.

Cultural operations.

(*See also* 2691-2696.)

2771. DE WET, A. F.
Preparing for the planting of deciduous fruit trees [in S. Africa].
Fmg S. Afr., 1949, **24**: 371-4, illus.

The author deals mainly with preparation of the land, but he also discusses time to plant and the need for windbreaks.

2772. HAARER, H. E.
Developing the hillside orchard.
Fruitgrower, 1949, **108**: 395-6, illus.

The value of contour ridging and planting of hillside orchards in Britain is discussed. Only slopes of less than 14 in 100 are suitable for this practice. [See also *H.A.*, 19: 1913.]

2773. BELOHONOV, I. V.
Spacing fruit trees in the orchard. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 3-11.

The various recommendations for spacing fruit trees in Russia are reviewed. It is shown how most of them have been unsuccessful and it is indicated that more attention should be given to locality, tree vigour and inter-planted crop. Tables are given showing spacing distances for (1) homogeneous plantings of vigorous and weak varieties of apple, pear, cherry, plum and

apricot; (2) permanent apple and pear trees with fillers; (3) strawberries, currants and raspberries in relation to soil moisture.

2774. Anon.
Pflanzlöcher im Sitzen herstellen. (A practical method of making holes for the planting of trees.)
Dtsch. Baumschule, 1949, **1**: 5: 78.
A mechanical drill driven by a tractor is described which drills 500-600 holes a day with a diameter of 35-70 cm. O.J.

2775. Preston, A. P.
The production of a primary branch framework on apple trees.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 55-63, bibl. 9, illus.
Notching above a bud to induce its development into a branch leader was used in forming open centre and delayed open centre trees of Cox's Orange Pippin, Laxton's Superb and Worcester Pearmain apple trees in the first season after planting, and data were obtained from other varieties grown as open centres. Most varieties reacted favourably to notching, but the reaction of Worcester Pearmain was very poor. Many notched buds of Worcester Pearmain, which failed to grow in the first season, formed suitable scaffold branch leaders during the second season after treatment. Crotch angle measurement on the lowest branch of open centre, delayed open centre and "regulated" trees showed the last to have the widest angles. A trial of five methods of forming delayed open centre trees with the varieties Cox's Orange Pippin and Worcester Pearmain at East Malling, is described.

2776. Preston, A. P.
Observations on the pruning of bush apples by renewal and spur methods.
The Fruit Year Book 1949, R.H.S. Lond., pp. 45-9, illus.
Discusses the effect of pruning methods on blossoming, and on quantity and quality of fruit.—East Malling Research Station.

2777. Black, M. W.
Hints on the pruning of deciduous fruit trees [in S. Africa].
Fmg S. Afr., 1949, **24**: 317-21, 344, illus.
Some practical advice for the beginner on winter pruning (1) young and (2) bearing trees of peach, apricot, Japanese and European plums, apple, pear, etc.

2778. Chadwick, L. C., and Nank, E. E.
The effects of certain pruning practices and wound dressings on callusing of tree wounds.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 226-32, bibl. 7.
Among interesting observations made on trees of English elm, *Ulmus procera*, in trials started in 1941 in Ohio are the following: Wounds treated with orange-shellac callused more rapidly than those treated with bordeaux-linseed oil or with 3 proprietary substances. Callusing of wounds made by the removal of limbs growing nearly at right angles to the trunk was faster than that in limbs growing at an acute angle. Wounds facing south and south-west healed most quickly. There are indications that the higher the wound the more rapid the callusing. A delay in treatment of 1 to 7 days did not appear to affect the rate of callusing.

2779. Wenzl, H.
Die Prüfung von Baumpflegemitteln nach der Wundhälftenmethode. (A method of testing materials for the treatment of pruning wounds.) [English summary 12 ll.]
PflSch. Ber. Wien, 1949, **3**: 112-16, bibl. 2.
The ordinary method of testing materials for the treatment of pruning wounds involves a relatively large number of surfaces, since two wounds are never strictly comparable. The author's method of comparing two halves of the same wound therefore constitutes a considerable simplification. Either two different materials are applied to the same wound with a narrow dividing line between them, or one half is used as a control. It has been found essential for the dividing line to run in the direction of the axis of the branch or stem, since the right and left halves behave as a mirror image, whereas the top and bottom halves show differences in callus formation. The tests were carried out on many varieties of fruit.—Bundesanst. f. Pflanzenschutz, Vienna.

2780. Davis, E. A.
The wound healing of trees as affected by plant growth regulating substances.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 233-8, bibl. 7.
Cysteine hydrochloride [which contains the -SH or sulphhydryl group], α-naphthaleneacetic acid, 3-indolebutyric acid and *o*-chlorophenoxyacetic acid were tested for ability to stimulate wound healing in sugar maple (*Acer saccharum*) growing at the Bartlett Tree Laboratories, Connecticut. There are strong indications that the first named can stimulate healing. The second and third substances inhibited healing, and the fourth gave slight promise.

2781. Weinberger, J. H.
Some effects of nitrogen fertilizer on yield and maturity of Elberta peaches.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 57-61, bibl. 3.
Spring applications of inorganic fertilizers in Fort Valley, Ga, were more effective in increasing yield and growth of Elberta peach trees than autumn or post-harvest applications, but they delayed maturity the most. After-harvest applications stimulated growth with minimum effect on fruit maturity. Cotton seed meal proved somewhat ineffective.

2782. Weinberger, J. H., Prince, V. E., and Havis, L.
Tests on foliar fertilization of peach trees with urea.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 26-8, bibl. 2.
Spraying urea on foliage of peach trees as a method of applying nitrogen proved unsuccessful at Beltsville, Md, and Fort Valley, Ga.

2783. Proebsting, E. L.
The effect of nitrogen on nonirrigated prunes.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 49-56, bibl. 56.

As with almonds [tested in a previous experiment] so with prunes the addition of nitrogen to trees in a N-deficient status gave a marked response even where water became noticeably deficient before full maturity. The application by dry injection to the soil of anhydrous ammonia was as effective as the broadcasting of ammonium sulphate.

2784. Hansen, C. J., and Proebsting, E. L.
Boron requirements of plums.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 13-20, bibl. 6.

Broadcasting borax on the soil surface in the late summer or autumn at the rate of 0·5 lb. per tree is recommended, as the result of experiments at Davis, Calif., for the elimination of boron deficiency in European plums marked by brown sunken areas on the fruits. Figures are given for normal and boron deficient plum leaves and fruits.

2785. Batjer, L. P., and Thompson, A. H.
Effect of boric acid sprays applied during bloom upon the set of pear fruits.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 141-2.

The application of boric sprays at 25 and 125 p.p.m. boron to Anjou pear blossoms near Wenatchee, Washington, resulted in increased pear set.

2786. Tavernier, J., and Jacquin, P.
Assimilation et fixation du bore par le pommier: fumure boratée appliquée par pulvérisation. **(Assimilation and fixation of boron by the apple tree: boron fertilizer applied by spraying.)**
C.R. Acad. Agric. Fr., 1949, **35**: 275-9.

The results are reviewed of trials in other countries on the application of boron to fruit trees in relation to the control of boron deficiency disorders. The experiment described in the present paper was with apple trees not showing any definite symptoms of boron deficiency. It was found that spraying the trees with a 0·25% solution of sodium borate immediately after petal-fall, and again a fortnight later, resulted in a rapid increase of boron content of the leaves, flowers, fruit and seeds.

2787. Bould, C.
Nutrient placement in relation to fruit tree nutrition. I. Problems and methods.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 46-50, bibl. 19.

The problems of nutrient placement and the effect of cover crop on soil fertility and tree nutrition are being studied at Long Ashton with particular emphasis on the effect of treatment on the nutrient status of the tree. The author discusses in turn the role of soil in fixing nutrients and making them available, methods adopted for applying nutrients *via* the soil, the introduction of nutrients through the aerial parts of the tree, i.e. solid or liquid injection and foliage sprays, and, lastly, indirect nutrition by cover crops and their treatment.

2788. Okanagan Plant Nutrition Committee.
Soil management for tree-fruits and truck-crops in the southern interior of British Columbia.
Hort. Circ. Dep. Agric. B.C. **76**, 1949, pp. 62, illus.

The important aspects of soil management, with the exception of problems of soil moisture and irrigation, are presented to the farmer. An introduction describing the origin and development of soils in the southern interior of British Columbia is followed by an account of the extent of soil erosion in the district, the factors causing it, and methods by which it may be controlled. In British Columbia the problem of water erosion in both irrigated and non-irrigated areas is serious and justifies the adoption of conservation methods. The value and management of cover crops in irrigated orchards is fully dealt with, and the use of manure, straw, sawdust, etc., to supply organic matter to land where water is in short supply is discussed. The final sections deal with the use of concentrated fertilizers and give general fertilizer recommendations for tree fruit and truck crops. In orchards in the Okanagan Valley, nitrogen and boron are generally the only 2 fertilizer elements needed. Applications of boron are required periodically to prevent corky core, drought spot and die-back. For truck crops control of boron deficiency is less simple, as vegetables vary considerably in their boron requirements. They are here grouped into 4 classes, according to their boron tolerance, and suitable rates of application recommended for each class.

2789. Hobbis, E. W.
Cultural systems for apples and pears.
The Fruit Year Book 1949, R.H.S. Lond., pp. 41-4.

Discusses clean cultivation, sloping sites, grassed orchards, and manuring.

2790. Rogers, W. S., Raptopoulos, T., and Greenham, D. W. P.
Cover crops for fruit plantations. IV. Long-term leys and permanent swards. V. Effect of form and time of application of nitrogen on orchard swards.
J. hort. Sci., 1948,* **24**: 228-70, 271-83, bibl. 24+16, illus.

The problem under investigation was how to produce organic material, for the benefit of the soil, by the relatively simple method of permanent swards or long-term leys in the orchard, without harming the trees. The present trial has shown that this can be done successfully, but that success depends on proper choice of suitable sward, fertilizer and cutting programme. Given that, not only can large amounts of organic matter be produced but the trees can benefit considerably both in quality and amount of crop. With unsuitable swards, cutting or fertilizer programme, a severe check to tree growth and cropping may be expected. The results show, for conditions such as those tested, that vigorous grasses like cocksfoot must be avoided; that mowing should be frequent (at least six times a year) and that, at least in the first three or four years, generous applications of nitrogen (about 5 cwt. or more per acre of sulphate of ammonia), must be applied in order to maintain satisfactory tree growth and cropping. Thus treated, the trees will not suffer and, further, the sod represents a store of fertility which can be cashed by turning in, resulting at once in a striking acceleration of growth and cropping if required. There are certain advantages to be gained by the

* Appeared August, 1949.

continued use of a sward, for instance great improvement of fruit colour and lessening of pre-harvest drop. There is also some evidence both from this and other experiments, that certain mineral deficiencies may be lessened. From the point of view of direct effects on the soil, it is of interest to note that although large amounts of organic material are produced, the percentage of organic matter in the soil does not increase rapidly. From the labour point of view, the use of swards has attractions also. Rather more mowings than cultivations are necessary per season, so there is probably little difference in the actual cost of the operations per season. But the presence of a sward makes the operations of pruning, spraying and picking much easier. The data quoted show that different swards and systems of management vary in the check or stimulus given to tree growth. It is therefore clearly necessary, when choosing a seeds mixture and deciding on an appropriate system of management, to consider factors such as rootstock, type of tree, soil and climate.

The results of the investigation have shown that all three nitrogenous fertilizers used (sulphate of ammonia, nitrate of soda and nitro-chalk) had the same effect on mixed grass and clover swards. Use of any one of these fertilizers resulted in an increase in the amount of fresh material produced and a decrease in the proportion of clovers in the sward. The biggest stimulus to growth of sward occurred when the fertilizers were applied early, before or during the period of maximum growth of the grasses. Fertilizers applied at intervals throughout the season February-September (" stream " application) were almost as efficient in increasing sward yield as when the whole amount was applied in February-March and were quite as potent in suppressing the clovers. The disappearance of clover appears at first sight to be inevitable, but, if it be considered desirable to maintain a high proportion of legumes in the sward, several ways in which this may possibly be achieved are suggested. [From authors' conclusions.]—East Malling Res. Stat., Kent. (See *H.A.*, 15: 487; 16: 1307.)

2791. Rogers, W. S., and Greenham, D. W. P.
The maintenance of soil fertility in orchards.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 124-7.

This is a summary of a more detailed review already abstracted [*H.A.*, 19: 1820].

2792. Adamson, N. J.
Subterranean clover as a cover crop in orchards.
N.Z. J. Agric., 1949, **78**: 577-8, illus.

One of the main benefits derived from growing subterranean clover [*Trifolium subterraneum*] as a cover crop in New Zealand orchards is the reduction of soil erosion by water. A complete covering of the ground is provided during winter and spring when sharp, heavy falls of rain very quickly scour away top soil, which either is lost or buries trees on lower slopes and valleys.

2793. Luckwill, L. C.
Changes in the botanical composition of orchard cover crops.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 33-7, bibl. 1.

Plots were laid down in the cider orchards at Long Ashton with a rye grass, a white clover and a rye grass+white clover mixture. At the end of three years, during which a gang mower was used at intervals of two to three weeks throughout the growing season with the exception of the period of fruit picking, there was a pronounced tendency on all plots for creeping bent grass (*Agrostis alba* var. *stolonifera*) to replace all the sown species, the white clover being the first to disappear. It is suggested that where a permanent cover crop is desired under relatively high summer rainfall conditions the possibility of using *A. alba* var. *stolonifera* should be considered.

2794. Bould, C., Tolhurst, J. A. H., and Jarrett, R. M.
Cover crops in relation to soil fertility and tree nutrition. An experiment with bush cider trees. Progress report—II.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 37-46, bibl. 2.

Cover crop treatments including perennial rye, white clover and annual cover crops did not affect crop yield in Sweet Alford, Dabinett or Stoke Red cider apple trees in the years 1946-1948. Nor, except as regards Dabinett, did they significantly affect girth increase over that period. In all cases girth increase was greater in trees on crab rootstock than in trees on Malling I rootstocks. On the other hand the effect of grass as compared with clean cultivation was to increase the percentage of K and P and to decrease that of N in the leaves. Annual cover crops had no significant effect on leaf nutrient status, while white clover was intermediate between grass and clean cultivation in its effects. Grass decreased the incidence of K deficiency leaf scorch and increased magnesium deficiency.

2795. Southwick, F. W., and Weeks, W. D.
Chemical thinning of apples at blossom time and up to four weeks from petal fall.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 143-7, bibl. 3.

Chemicals used were 40% dinitro-ortho-cyclohexylphenol and NaNAA. Results are discussed.

2796. Dermine, E.
Essai d'orientation sur l'éclaircissage chimique des fleurs par pulvérisation de produits caustiques. **(Thinning flowers by spraying with caustic preparations.)**
Fruit belge, 1949, **17**: 118-23, illus.

Thinning flowers was carried out on three varieties of apple, including Cox's Orange Pippin, by the application of Super-Elgetol (a dinitrophenol preparation) at concentrations varying from 0·05 to 0·4% during flowering. The results are tabulated and the effects produced at the different concentrations described. It is concluded that chemical thinning was satisfactorily obtained by applying Super-Elgetol at 0·1 to 0·2% during flowering, and it is considered that such treatment would have an effect on biennial bearing.

2797. Luckwill, L. C.
The effect of growth substances applied at full bloom on fruit set and fruit drop in the apple.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 25-32, bibl. 3.

In trials at Long Ashton, α-naphthaleneacetic acid at 5 p.p.m., 2,4-dichlorophenoxyacetic acid at 1 p.p.m. and indolylacetic acid at 5 p.p.m. were all effective in reducing fruit set without damage to the foliage of Lane's Prince Albert apple trees. Moreover, all the sprays used were very active in reducing the abscission of unpollinated flowers and growing fruitlets, but this reduced drop was compensated for by a heavier drop later on. None was active in stimulating parthenocarpic development of emasculated blossoms. α-naphthaleneacetic acid at 10 p.p.m. applied just before June drop delayed but did not reduce the drop. The experiments were complicated by an attack of sawfly larvae, in which connexion it may be noted that 60% of the set fruitlets on the control trees were destroyed by the larvae but only 35% on the treated trees.

2798. VYVYAN, M. C., WEST, C., AND BARLOW, H. W. B.
Use of sprays to control fruit drop. V. Effect of a naphthalene-acetic acid (NAA) spray, and of a delay in picking, on the rate of dropping and the storage behaviour of Cox's Orange Pippin apples.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 86-91.

A fortnight's delay in picking greatly improved the quality of Cox's Orange Pippin apples after 3 months' storage, but the delay resulted in heavy fruit-drop. A spray of NAA, applied about a month before picking, largely controlled this drop and did not affect the quality of the fruit.

2799. MITCHELL, A. E., HAMNER, C. L., AND TOENJES, W.
The effect of 2-methyl,4-chlorophenoxyacetic acid in preventing preharvest drop of apples.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 163-8, bibl. 2.

In trials at the Graham Experiment Station of Michigan State College 2-methyl,4-chlorophenoxyacetic acid was effective in controlling preharvest drop of Oldenburg, McIntosh and Northern Spy apples when used at concentrations of 20 p.p.m. and 30 p.p.m. The sodium salt of naphthaleneacetic acid at 10 p.p.m. added to 2-methyl,4-chlorophenoxyacetic acid at 20 p.p.m. gave no more protection in preventing preharvest drop of Northern Spy apples than did 2-methyl,4-chlorophenoxyacetic acid alone at 20 p.p.m. [Authors' summary.]

Harvesting, packing and processing.

2800. BIRRELL, D.
Estimating the top fruit crop.
Grower, 1949, **32**: 148-9, 151.

A method is described for estimating the yield (in bushels) of an apple crop while still on the trees. It is based on sample branches of sample trees and a knowledge of the average number of apples per bushel in each variety.

2801. BLONDEL, L.
Triages des prunes par des solutions salines. **(Sorting plums by use of salt solutions.)**
Ann. Inst. agric. Algér., 1947, **3**: 159-70 [published 1948, received 1949].

An account of laboratory trials concerned mainly with sorting fruit according to its degree of maturity.

2802. MINISTRY OF AGRICULTURE.
Recommended grades for pears produced in England and Wales, for experimental use by growers and packers.
Market. Leafl. Minist. Agric. Lond. **104**, 1949, pp. 4, illus.

The national grades and grade definitions for pears, recommended for experimental use by the Advisory Committee on Standard Grades and Packs, are scheduled. These cover the bulk of the gradable pear crop and not the highest grades only. The Ministry proposes to make the grades statutory as soon as provision has been made for effective grade assessment and certification of standard packs of graded pears. In the meantime, this publication will enable growers, packers and distributors to gain experience from trial use of the grades.

2803. MARTIN, D.
Trends in packaging of apples and pears in U.S.A.
Food Pres. Quart., 1949, **9**: 5-11, illus.

The packing is considered under the following heads:— Consumer packages, packer to consumer packaging, and bulk packages.

2804. MINISTRY OF AGRICULTURE.
Factors in the marketing of home-produced apples in England and Wales.
Econ. Ser. Minist. Agric. Lond. **50**, 1949, pp. 68, 1s. 3d.

This bulletin presents a statistical picture of the industry. Production figures of market and cider apples in the United Kingdom, and distribution of important apple-growing areas are discussed, some import and export figures are given, and an analysis is made of the total sources of supply throughout the year. The inadequacy of the data points to the need for regular and detailed surveys of the situation. Chapters on marketing arrangements deal very fully with the problems of packing, grading, storage and transport, and constructive suggestions are made for improving the present disorderly position. The following points are outstanding among the conclusions reached. A substantial part of the marketing problems arise from production factors, namely, too few dessert and too many cooking apples, together with the volume of low quality apples. Some form of standardization, along voluntary lines, is essential if home-produced fruit is to compete with imports. Co-operative packing and marketing organizations, developed in suitable areas, would raise the standard of production and relieve the bottle-neck in London by supplying provincial markets direct. The disposal of surplus low standard produce is a problem that must be faced. Since the industry is being asked to plant 10,000 acres of dessert apples in the next 4 years, it is most desirable that the assembly and marketing arrangements for this acreage should be planned before planting takes place. Notes on developments in the marketing of vegetables and fruit overseas, and specifications of standard apple containers (National Mark) are given as appendices.

2805. Mrak, E. M., and Phaff, H. J.
Sun-drying fruits.
Circ. Calif. agric. Exp. Stat. **392,** 1949, pp. 19.
The directions concern the various operations involved in sun-drying apricots, peaches, pears, prunes, grapes for raisins and currants, cherries and persimmons.

2806. Gavrel, M.
Le séchage des figues dans le Riff marocain. **(The [air] drying of figs in the Rif of Morocco.)**
Fruits d'outre mer, 1949, **4**: 100-3, illus.
On local practices and the establishment of co-operatives among the natives.

2807. Anon.
Small growers and processing—safeguard against gluts.
Fruitgrower, 1949, **108**: 448-9, illus.
One year's trial with a grower-quick freezing unit at Ditton Court Farm, Kent, suggests that quick freezing fits in well with the normal activities of the fruit farm, offers a valuable outlet for fruit in glut seasons, and can be run economically.

Noted.

2808.

a Baker, C. E.
Filler apple trees and their management.
Bull. Purdue agric. Exp. Stat. **474,** 1942, pp. 14, bibl. 4, illus. [received 1949].

b Bregger, J. T.
The " Big Three " early peaches.
Fruit Var. hort. Dig., 1949, **4**: 73.
Redhaven, Dixigem and Jerseyland.

c Cravens, M. E., Jr., and Cardinell, H. A.
An appraisal of the market quality of Michigan peaches. (Progress report.)
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 472-81.

d Dermen, H.
Ploidy in the Hibernal apple and in some *Malus* species.
J. Hered., 1949, **40**: 162-4, bibl. 10.

e Einset, J., and Imhofe, B.
Chromosome numbers of apple varieties and sports. II.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 197-201.

f Evreinoff, V. A.
Le bibacier. **(Loquat culture.)**
Fruits d'outre mer, 1948, **3**: 410-17, bibl. 22, illus.

g Marinucci, M.
L'olivo e la potassa. **(The olive and potash.)**
Reprinted from *G. Agric.,* 1941, No. 50, 1942, No. 1, pp. 5 [received 1949].
A plea for the potassic manuring of olives.

h Oberle, G. D.
Germination trials on open pollinated peach pits from the 1945 crop of named varieties and seedling selections [at Geneva, N. York].
Proc. Amer. Soc. hort. Sci., 1949, **53**: 221-5.

i Potter, J. M. S.
Late-keeping apples.
The Fruit Year Book 1949, R.H.S. Lond., pp. 134-42.
For English conditions.

j Sadana, J. C.
Carotenoids of loquat (*Eriobotrya japonica* Lindl.).
Biochem. J., 1949, **44**: 401-2, bibl. 2.

k Savage, E. F.
Peach varieties in the Southeast.
Fruit Var. hort. Dig., 1949, **4**: 63-7.

l Schneider, G. W.
Characteristics of progeny from certain apple crosses [at New Brunswick, N.J.].
Proc. Amer. Soc. hort. Sci., 1949, **53**: 205-12, bibl. 5.

m Sívori, E.
Crecimiento anual de la higuera (*brevas e higos*). **(The growth cycle of the fig tree; the early and late crop.)**
Rev. argent. Agron. B. Aires, 1949, **16**: 78-80, illus.

n Thomas, P. H.
Pear culture in Tasmania.
Fruit World, Melbourne, 1949, **50**: 8: 24.

o Thomas, W., and others.
Foliar diagnosis: the range in the zinc content of young apple trees.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 6-10, bibl. 5.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2715, 3594.)

2809. Reid, R. D.
Soft fruits in Scotland.
The Fruit Year Book 1949, R.H.S. Lond., pp. 20-1.
With particular reference to raspberries and strawberries. The present acreage under soft fruits is shown. Raspberries occupy about two-thirds of it. New seedling raspberries from East Malling have been introduced. The new strawberry variety Auchincruive Climax which is resistant to red core disease, was released in 1947 and is being extensively planted in all parts of Scotland.

2810. Tydeman, H. M.
Amos Black: a promising new black currant variety.
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** p. 82, illus.
The variety described is from a cross between Goliath and Baldwin in 1926. It ripens about a fortnight later than Baldwin, and is much later in flowering than most other varieties so that the flowers are less liable to frost injury. The fruits are larger than those of Baldwin

and their tough skins enable them to travel without damage.

2811. LUCKWILL, L. C.
A note on the unfruitfulness of a rogue strain of the blackcurrant variety "Invincible Giant Prolific".
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 22-5, bibl. 4.

Notes are given of the prevalence and unfruitfulness and other characters of a rogue strain of the Invincible Giant Prolific blackcurrant. Hormone and other treatments tried have not been successful in making it crop more freely. Where recognized it should be destroyed.

2812. SHUTAK, V., CHRISTOPHER, E. P., AND MCELROY, L.
The effect of soil management on the yield of cultivated blueberries.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 253-8, bibl. 5.

Sawdust-mulched plots of Pincer blueberry plants produced significantly higher yields than plots under straw mulch, clean cultivation+cover crop or clean cultivation throughout. Soil pH was significantly higher under the sawdust mulch than in clean-cultivated plots. Soil moisture was greatest under straw mulch, less under sawdust, and least under clean cultivation. Soil temperature of plots under mulches showed very little fluctuation whereas soil temperature in clean-cultivated plots exhibited great fluctuation. [From authors' summary.]

2813. MICKLEM, T.
Cape Gooseberry [*Physalis peruviana*] culture in the Western Cape Province [S. Africa].
Fmg S. Afr., 1949, **24**: 379-82, bibl. 8, illus.

A crop of growing importance, the tonnage sent to S. African canneries alone in 1947-48 being 1,866 compared with 388 tons in 1938-39. Four types of *Physalis* are briefly described: (1) Cape Gooseberry, (2) Tomatillo (*P. ixocarpa*), (3) Ground-cherry or Husk-tomato (*P. pubescens*), and (4) an unclassified "wild" *Physalis*, the fruit of which is not used commercially. Soil and climatic requirements, propagation, planting, cultivation, irrigation, manuring, pests, diseases, and harvesting are discussed in turn. [No yield per acre figures are quoted.]

2814. JUNE, R. I.
Production of small fruits increasing in Hawke's Bay.
N.Z. J. Agric., 1949, **78**: 619-24, illus.

The area under raspberries, the most widely-grown small fruit in the Hawke's Bay district, increased there from 5 or 6 acres in 1943 to 96 acres in 1947 and 116 acres in 1948. That is the largest area grown in any district of the North Island, and it is still expanding. The methods adopted by the growers for raspberries, strawberries, gooseberries, black currants, boysenberries and loganberries are discussed. A brief reference is made to passion fruit and Chinese gooseberry.

2815. ANON.
Survey of raspberry growing in Nelson.
N.Z. J. Agric., 1949, **78**: 587-92.

This summary of assessed costs of production in the Nelson district is published to provide growers and instructors with the basic data necessary for formulating further investigational work to secure increased efficiency.

2816. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sortsforsøg med hindbaer 1938-48. **(Raspberry variety trials 1938-48.)**
Dansk Havebr., 1949, **8**: 166-7, being *Medd. Statens Forsøgsvirks. Plantekult.* **441**.

From the trials, carried out at three Danish research stations, Preussen emerged as the highest yielding raspberry variety, with Lloyd George a close second and Spangsbjerg No. 140 third. The best yielders were found to supply also the highest percentage of berries of dessert quality, viz. 40-45%. Preussen is the most widely-grown raspberry in Denmark, both in commercial plantings and in private gardens. The suitability of the Spangsbjerg varieties for quick freezing and juice production is being studied.

2817. WOOD, C. A.
Raspberry cane nurseries.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 141-7.

The functions and advantages of special cane nurseries for raspberries are explained, and the planting, maintenance, roguing, harvesting and productivity of such nurseries are described in the light of recent experience in Scotland. [See also *H.A.*, 15: 506 and 1496.]

2818. MINISTRY OF AGRICULTURE, LONDON.
First report on investigations on South Hampshire strawberry problems.
[*Publ.*] *N.A.A.S., S.E. Province, Reading*, 1949, pp. 21, bibl. 9.

Report of a field trial carried out at the N.A.A.S. Horticultural Experiment Station, Botley, to test the varietal susceptibility of 8 strawberry varieties to red core disease (*Phytophthora fragariae*). The results did not form an adequate basis for a susceptibility classification but confirm the opinion that Early Cambridge, Perle de Prague and Climax are highly resistant. A summer wilt, however, that attacks varieties irrespective of their known susceptibility to red core was observed, and is considered an even more serious problem. The factors causing this wilt are not known, but may be related to bad physical soil conditions.

2819. ROGERS, W. S.
Strawberry varieties.
The Fruit Year Book 1949, R.H.S. Lond., pp. 49-50, illus.

Five varieties of pleasant shape and colour [shown in colour] of interest to the amateur are briefly described, viz. Sir Joseph Paxton, Perle de Prague, Early Cambridge, Auchincruive Climax, and Royal Sovereign. The author's recommendation to the discriminating amateur is to grow only Royal Sovereign and Climax at present. If runners holding the "special stock" certificate of the Ministry of Agriculture are purchased, the two varieties can safely be grown alongside each other.—East Malling Research Station.

2820. ROGERS, W. S.
A bud sport in Royal Sovereign [strawberry].
Grower, 1949, **32**: 413-14, illus.

A report of a chimera found in England in a stock of Royal Sovereign M40 in which the hairs on the leaf-stalk pointed upwards instead of outwards. Evidence suggests that the variant is confined to certain stocks sent from East Malling Research Station in 1947-48. It should be eliminated from stocks used for runner raising. It is not yet known whether this chimera is sectorial or mericlinal. This is thought to be the first report of a chimera occurring in the strawberry.

2821. ROGERS, W. S.
A comparison of the strawberries Perle de Prague and Madame Lefebvre.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 136-7.
The strawberry variety Perle de Prague is considered to be superior to Mme. Lefebvre for the early market.

2822. GILBERT, F.
The Redcrop strawberry.
Fruit Var. hort. Dig., 1949, **4**: 67.
Redcrop is a heavy yielder of large, high-quality berries ripening 2-4 days after Pathfinder. The variety, which has a long picking season, has been developed at the Agricultural Experiment Station of Rutgers University, N.J.

2823. STARCEV, P. P.
Growing strawberries on sandy soils. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, p. 61.
For growing strawberries on dry sandy soils, planting in furrows, 70 cm. apart and 12-18 cm. deep, is advocated. The advantages claimed are, that during rain or with irrigation the water tends to accumulate round the plants rather than between the rows, and that the application of organic manures is simplified.

2824. ROBINSON, W. B.
The effect of sunlight on the ascorbic acid content of strawberries.
J. agric. Res., 1949, **78**: 257-62, bibl. 8.
The synthesis of ascorbic acid in strawberries is stimulated by exposure to sunlight. With a 57% decrease in the amount of illumination during development and ripening, the ascorbic acid content averaged 36% lower. The data in this paper indicate that the degree of illumination of the leaves is the most important factor in this relationship. The amount of ascorbic acid in the ripe fruit appears to correspond to the amount of illumination on the fifth or sixth day prior to harvest. Differences in ascorbic acid content of strawberries on the fresh-weight basis occurred at different locations with the same amount of illumination. However, if the ascorbic acid is expressed on a dry-weight basis the differences due to environmental factors other than sunlight were insignificant.—New York State Agricultural Experiment Station. [Author's summary.]

Vines.

(*See also* 3522.)

2825. SAMARAKIS, M. B. A.
Rapport général sur la situation de la viticulture dans le monde. **(Vine growing throughout the world.)**
Bull. Off. int. Vin, 1949, **22**: 29-82.
The paper is the Secretary's report to the 28th plenary meeting of the Office International du Vin in Paris in July, 1949, dealing with individual vine-growing countries in turn.

2826. FRANCIS, L. R.
South Australian grape varieties—and some considerations for future plantings.
J. Dep. Agric. S. Aust., 1949, **52**: 337-41, bibl. 1.
The distribution and acreage of the chief South Australian wine grape varieties are mentioned, with comments. The State is unable at present to import varieties from other states and countries for fear of introducing phylloxera.

2827. READ, F. M.
The grape industry in California.
J. Dep. Agric. Vict., 1949, **47**: 163-72, 174, 193-7.
An account based on observations made by the author during visits to the San Joaquin Valley, California, in October, 1948, on vineyard work, including the harvesting of grapes for drying, the cleaning and packing of dried fruit, and the packing and handling of fresh grapes for the United States market.

2828. DICKEY, R. D., AND OTHERS.
Grape growing in Florida.
Bull. Fla agric. Exp. Stat. **436**, 1947, pp. 47, bibl. 12, illus. [received 1949].
A revision of *Bull.* 324 [see *H.A.*, 9: 1194]. The information given is largely the same, and concerns varieties, rootstocks, propagation, cultivation, training, fertilizing, harvesting and marketing practices and pest and disease control of the American Bunch type and the Muscadine type grapes, the only two types grown in Florida. The six most important American Bunch type varieties, Extra, Niagara, Carman, Muench, Bailey, and Fredonia, are discussed in greater detail than before, and the techniques of grafting and pruning, training and trellising are described and illustrated more fully. Among the recent introductions of value are mentioned the perfect-flowered varieties of Muscadine grapes that do not need pollinators, the use of *Indigofera hirsuta* as a cover crop, and the mobile packing unit by means of which grapes can be packed in the vineyard with the minimum of handling. To-day commercial vineyards have practically disappeared in Florida. The failure of attempts to establish a grape industry there is attributed to the short life of present varieties, susceptibility to diseases which necessitates a costly spray programme, difficulty of marketing the fruit profitably when produced in considerable volume, and high cost of trellising materials.

2829. GARINO-CANINA, E.
Acclimatazione di vitigni stranieri pregiati nel Piemonte. **(Acclimatization of valuable foreign vines in Piedmont.)**
Reprinted from *Ann. Accad. Agric. Torino*, 1944, Vol. **87**, pp. 11 [received 1949].
A preliminary account of the growth at the Institute at Turin of a few of the best known vines of Burgundy, Bordeaux, Germany and Spain and the South of France. Tables are given of analyses of musts and vines.

2830. ANON.
L'appellation d'origine " Tarragona ". **(The meaning of the term Tarragon.)**
Bull. Off. int. Vin, 1949, **22**: 221: 42-9.
Tarragon is the name of a town and province in north-east Spain which produces a number of white and red dessert wines. Brief notes are given on the vines grown, including 3 *Vitis orientalis* varieties for the red wine, and of the wine-making processes.

2831. BROCK, R. B.
Viticulture in England.
The Fruit Year Book 1949, R.H.S. Lond., pp. 111-14, illus.
The investigations under way at the author's viticultural research station at Oxted, Surrey, now in its fourth year, are described. As vines are very susceptible to injury from spring frost, attention is being given to varieties that can be grown unprotected and those that thrive and crop under cloches. Four varieties that would probably succeed in the open and six for use under cloches are mentioned. So far as is known there is no phylloxera in England, and vines can therefore be grown on their own roots. Precautions against its entry must be maintained.

2832. POTAPENKO, JA. I.
Viticulture in the central zones of Russia. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture, 1949, No 7, pp. 12-17.
Viticulture in the central regions of Russia is discussed in relation to their various climates (the sum of the effective temperatures, soil moisture, altitude, aspect) and the use of frost-resistant rootstocks, shelter belts, and early ripening varieties is advised. Each region should ascertain the varieties most suited to its conditions.

2833. LEONOV, I. M.
The grapevine in Siberia. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 38-40.
Early attempts to raise varieties of grapevine hardy enough to withstand Siberian conditions were unsuccessful, but two new seedling varieties raised and here described by the author are said to be frost-resistant, fruitful, and to yield grapes of good quality.

2834. DALMASSO, G.
A che punto è la genetica viticola ? **(Vine breeding to-day.)**
Humus, 1949, **5**: 2: 1-7.
The author, himself a notable vine breeder, notes the destruction wrought by the war on the chief Italian centres of vine breeding, e.g. at Grotta Rossa and Velletri, near Rome, at Conegliano, and elsewhere, and discusses briefly some of Pirovano's results, an account of which was given at a conference held at Turin in October, 1948. From that he passes, after a note on French and Californian work, to the investigations at Müncheberg and the present proposals made by Breider for relevant stations in the Rhineland and the urgency and necessity for such establishment.

2835. LEVADOUX, L.
La sélection chez la vigne. **(Selecting grapevines.)**
Prog. agric. vitic., 1949, **131**: 200-6, 227-31, 248-53, 273-7, 300-7, 324-8; **132**: 4-9, 27-33.
The author discusses at length the conception of " clone " and describes how a clone fluctuates according to its environment and how it may be modified by diseases and by vegetative mutation (bud sports). The French term " cépage " is considered as a population composed of a certain number of clones, the homogeneity of each clone being disturbed by virus diseases. Traditional methods of selection are described and a more exact clonal selection is advocated.

2836. MARTÍNEZ-ZAPORTA, M.
Experiencias correspondientes al año 1948 sobre enraizamiento de portainjertos usuales con sangre de berlandieri. **(Trials in 1948 on the rooting of Berlandieri rootstocks.)** [English summary ½ p.]
Bol. Inst. Invest. Agron. Madrid, 1949, **9**: 20: 1-47, bibl. 9, illus.
Experiments are described for testing the effect of heteroauxins on cuttings of vine rootstocks, which normally root only with difficulty. The substances used were β-indolylacetic acid at 60 and 75 mg./l, potassium salt of naphthaleneacetic acid at 35 and 55 mg./l, and certain Dutch commercial products of β-indolylacetic acid, β-indolylbutyric acid and α-naphthaleneacetic acid. The vines used were 41 B de Millardet (Chasselas × Berlandieri) and 161-49 de Couderc (Riparia × Berlandieri). No significantly favourable results were obtained as regards the number of roots, but a better quality was obtained. Superficially wounding the base of stems and immersing them in water for 12 hours gave satisfactory results, yielding 84·33% rooted stems of very good quality of 41 B de Millardet.

2837. PRINC, JA. I.
Growing vines on their own roots in areas where they are usually grafted. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 8, pp. 10-12.
To increase the area for vine-growing in Russia it is necessary not only to plant vines grafted on phylloxera-resistant rootstocks but also to raise them on their own roots, particularly in northerly regions of the zone where grafting is practised, as in the Ukraine and Moldavia, where grafted vines suffer from frosts, and where the loss from phylloxera is less than in the south. In some soils own-rooting vines can be grown in the grafting zone if suitable varieties are selected and special methods of cultivation are used. Types of soil in which own-rooting vines can be grown successfully are described.

2838. MARKIN, M. I.
Propagating vines by softwood cuttings. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 8, pp. 8-10.
KURČIN, V. M.
Hastening the raising of vine seedlings from short cuttings. [Russian.]
Vinodelie i vinogradarstvo. (Wine-making and viticulture), 1949, No. 6, pp. 11-13.
BALAŠOV, P. K.
Propagating the grapevine by summer cuttings. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 5, pp. 19-20.

Each of these three articles describes, with slight variations, a method of propagating vines from softwood cuttings each consisting of an internode and two buds. The cuttings, struck in a greenhouse or frame under moist, shaded conditions, send out roots in 10 to 20 days.

2839. Vallés Nadal, D. L.
El cultivo mecánico del viñedo con tractor. **(Tractor cultivation in the vineyard.)**
Anal. Esc. Perit. agric. Barcelona, 1948, **7**: 99-141, illus.

The advantages of tractor cultivation (particularly with the caterpillar tractor) in vineyards are pointed out and its employment in the various operations throughout the year including spraying against mildew and the application of manures is described and illustrated. The economics of tractor cultivation are discussed.

2840. Medvedev, P. F.
Sida—a new tying and binding material. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 6, pp. 13-16.

In relation to the development of horticulture and viticulture in Russia the need for a cheap tying and binding material is pointed out, and the cultivation of perennial sida [? *Sida rhombifolia*] is recommended as a source of bast fibre. Two varieties, grey and green, are recognized, the former yielding a better product but a less vigorous plant than the latter. Sida is reproduced from seeds, shoot cuttings, and particularly root cuttings. The seed has a hard seed coat and it should be vernalized before it is germinated; if this is not possible, abrasion of the seed coat with sand is recommended or the seed should be immersed in hot water at 50-52° C. for 3-5 minutes. The plant is not very sensitive to drought and it is frost resistant. It is possible to obtain two crops of stems per year.

2841. Basteleus, R.
Het uitkorrelen der druiven. **(Thinning grapes.)**
Cult. Hand., 1949, **15**: 340-2, illus.

Advice on the manner and degree of thinning glasshouse grapes. The percentage of berries that should be left on the bunches for certain varieties are, Black Alicante 65, Frankenthal 50 to 60, Muscat of Alexandria 15 to 35, Buckland Sweetwater and Chasselas 15 to 25, and Canon Hall 5 to 10.

2842. Dhillon, A. S., and Singh, L.
The efficacy of cane and trunk ringing of grapevines.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 259-62.

One year's trials on the Black Prince (*Vitis vinifera*) vine at Lyallpur, East Punjab, India, showed little difference resulting from ringing trunks or canes. Since the former tends to exhaust the vine the authors consider that the ringing of canes or those parts of the vine which are to be removed the following season is preferable.

2843. Dhillon, A. S., and Singh, L.
The influence of thinning and ringing on the cropping and quality of grapes and the vigor of grapevines.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 263-8.

One year's experiments at Lyallpur merely confirm the supposition that thinning and ringing may be useful, the first for invigorating the vines, the second for inducing early fruiting.

Nuts.

(*See also* 2716.)

2844. Mort, C. H.
Twenty years of investigation into almond culture.
Agric. Gaz. N.S.W., 1949, **60**: 246-50, bibl. 5, illus.

The main aspects of twenty years' almond investigations in New South Wales are discussed under variety testing, pollination studies and crossbred trials, testing crossbred seedlings, crossbred variety trial, information published. A diagram shows the blossoming range of 7 varieties of almonds at the Wagga Experiment Farm.

2845. Griggs, W. H.
Effect of low temperature on blossom survival and fruit set of nineteen varieties of almonds.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 125-8, bibl. 2.

Observations at Wolfskill, Calif., in 1948 showed that the resistance of almond blossoms to low temperatures depended largely on their stage of maturity, though there were significant differences in survival and set as between different varieties.

2846. Blackmon, G. H.
Pecan growing in Florida.
Bull. Fla agric. Exp. Stat. **437**, 1947, pp. 72, illus. [received 1949].

Pecan growing in Florida began in the first half of the nineteenth century with seedling trees in various parts of the state. Now the commercial pecan area is located in the northern and western parts, and in 1946 the production was 4½ million lb., more than half of this being from trees of named varieties. Only a few of the many varieties tried are profitable in Florida, but Schley, Stuart, Frotscher, Mahan, Curtis and Moneymaker are grown extensively. It is not advisable to plant varieties originating in the western part of the pecan belt in the humid section, as most of these are highly susceptible to scab. The seedling pecan is used as stock, and for Florida conditions it is important not to use seedlings originating from scab-susceptible varieties. Stocks are budded by the annular or patch method or grafted by the whip-and-tongue method in the nursery. Orchard trees should be planted out as early as possible in the dormant season and set at least 50 ft. apart. A constant and adequate supply of moisture is essential, and in Florida either a cover crop or cash crop system of cultivation is practised; cover crops of legumes, however, are recommended, especially with bearing trees. For harvesting, a mechanical tree shaker is recommended, but poles are still used by many for knocking the nuts off the trees. Growers generally market their nuts ungraded and in bulk through auction and private sales.

2847. Rovskiĭ, V. M.
The pecan in central Asia. [Russian.]
Priroda (Nature), 1949, No. 6, pp. 61-4, bibl. 5.

The introduction of the pecan, *Carya olivaeformis* [=*C. pecan*], into parts of central Asia is described. It is sufficiently resistant to the summer heat and winter frosts and can be recommended for extended cultivation there.

2848. MAURI, N.
Contribution à l'étude et à la classification des variétés de pacanier. **(Contribution to the study and classification of pecan varieties.)**
Ann. Inst. agric. Algér., 1948, **4**: 2: 1-43, illus.

This study, carried out on growing trees at the Station Experimental d'Arboriculture de Boufarik, Algeria, was stimulated by the interest shown in the pecan as a complementary crop. Numerous differences, morphological and physiological, were noted between varieties. Seedling trees showed variations which rule out propagation from seed for commercial plantations. Some interesting seedlings were, however, discovered and these will be propagated by grafting. Sixteen varieties are described and a key provided for their identification. The variety Elizabeth appears to be best. P.22 and P.176 are promising.

2849. K[EMMER], E.
Die Walnussveredlung. **(Grafting and budding the walnut.)**
Merkbl. Inst. Obstb. Berlin **5**, 1949, pp. 15.

This is the second edition of Professor Kemmer's bulletin on walnut grafting and budding. It was first issued in 1936 [*H.A.*, 7: 314] and in the present edition the text is the same except that an introductory paragraph is added, and one illustration (XI) has been replaced by another.

2850. RUGGIERI, G.
Stato attuale delle nostre conoscenze sulle varietà di nocciuolo coltivate in Sicilia ed opportunità del loro studio biologico. **(The filberts of Sicily and their biological problems.)** [English summary ½ p.]
Ann. Sper. agrar., 1949, **3**: 509-19, illus., bibl. 22.

Observations on the filberts grown in different parts of Sicily show that, although certain varieties predominate in certain districts, in general they are very much mixed and vary immensely in value. The author, after noting certain biological features of some of the varieties found, utters a plea for a comprehensive study of the whole filbert population with a view to the establishment of varieties likely to do well.—Staz. sper. Frutt. Acireale.

Noted.

2851.
a ANON.
Marketing of wild fruits.
J. Dep. Agric. Eire, 1948, **45**: 133-8.
Blackberries, bilberries, crab apples and sloes.

b CÁCERES, M. R.
Ramificación del tubo polínico en "*Vitis vinifera*". **(Branching of the pollen tube in *Vitis vinifera*.)**
Rev. argent. Agron. B. Aires, 1949, **16**: 178-9, bibl. 5, illus.

c MORROW, E. B., DARROW, G. M., AND RIGNEY, J. A.
A rating system for the evaluation of horticultural material.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 276-80.
Blueberries and strawberries.

d OBERLE, G. D., MOORE, R. C., AND NICHOLSON, J. O.
Parents useful in breeding autumn-fruiting red raspberries for Virginia.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 269-72, bibl. 6.
Especially Sunrise.

e POTTER, J. M. S.
Red currant "Red Lake".
The Fruit Year Book 1949, R.H.S. Lond., p. 115, illus.
A promising introduction from Minnesota.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3029-3036, 3072k.)

2852. BRIEJÈR, C. J. (Editor).
Overzicht van de belangrijkste ziekten en plagen van landbouwgewassen en haar bestrijding. **(A summary of the most important diseases and pests of agricultural plants and their control.)**
Meded. PlZiekt. Dienst **92**, 1949, pp. 189, illus., 7th, revised, edition.

The greater part of this brochure (pp. 9-133) takes agricultural crops in turn, including peas, beans and potatoes, and, in two columns, describes their diseases and the corresponding control measures. The rest deals with more general subjects such as seed disinfection, control of soil infesting pests (leather-jackets, cockchafer larvae, wireworms, etc.), flea beetles, aphids, molluscs and rodents, chemicals used in control measures, preparations used in destroying potato haulms, and deficiency disorders. Although the advice given primarily concerns field crops, it is in some cases applicable to certain garden vegetables, e.g. potatoes, peas and beans. The book is well illustrated by 18 plates of photographs and 8 text figures.

2853. STEVENS, R. B.
Replanting "discarded" varieties as a means of disease control.
Science, 1949, **110**: 49, bibl. 3.

The author's main thesis is "that varietal rotation should be studied as a means of disease control. The simple fact that a pathogen is new stands as direct evidence that the older varieties were highly resistant to it, and that it was therefore formerly rare. After five or ten years of widespread plantings of a new host type, it may well be that formerly well-known species or races of pathogens will have become scarce, and that older host varieties can be replanted with profit. That many of these discarded varieties are highly desirable

has been clearly shown. By selecting for a given crop several commercially desirable varieties of widely differing susceptibility, it should be possible to work out a type of rotation which would hold disease losses at a low level. Rotations involving varieties of the same host species will require great care."

2854. von Bronsart, H.
Der heutige Stand unseres Wissens von der Bodenmüdigkeit. **(Soil sickness, our present knowledge.)**
Z. PflErnähr. Düng., 1949, **45**: 166-93, bibl. 40.

The discussion of soil sickness, on which the author has done original research [see *H.A.*, 19: 1899], shows that in tree nurseries at least three different types of the trouble are described under the same name. The expensive panacea—soil sterilization with carbon disulphide—cannot be replaced by specific remedies while the causes are not fully known. The biological aspect of the problem is stressed, viz. that the natural habit of fruit trees is to occur singly in woods.

2855. Roussel, L.
Complainte sur la disparition des oiseaux utiles. **(The disappearance of useful birds.)**
Fruits et Prim., 1949, **19**: 206-8.

Wholesale destruction of small birds has aggravated the insect pest problem in North African fruit culture. A plea is made for their preservation.

2856. Bullock, R. M., and Ackley, W. B.
Hard end and cork spot of pears as influenced by high-concentration hormone sprays.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 174-6, bibl. 5.

Trials at Wenatchee in 1948 show that hard end of Bartlett and cork spot of Beurré d'Anjou pears and the maturity of both varieties can be influenced by high concentrations of certain hormone sprays.

Nutritional disturbances.

(*See also* 2784-2788, 2808o, 2886.)

2857. Hagler, T. B., and Scott, L. E.
Nutrient-element deficiency symptoms of muscadine grapes in sand culture.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 247-52, bibl. 5.

Dulcet and Hunt muscadine vines were successfully grown at College Park, Md, in sand culture. Deficiencies were easily seen. Vines which received complete nutrition grew better than 1-year-old layered vines in the field.

2858. Dowd, O. J.
Observations on boron deficiency in apples in southwestern Michigan.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 23-5, bibl. 2.

Indications of the need for borax treatment of certain apple orchards on light sandy soils of Michigan and of the appropriate amounts to be given.

2859. Breviglieri, N.
L'ambiente ecologico e le piante da frutto. **(Soil environment and fruit plants.)**
Reprinted from *Sci. Técn. Agric. ital.*, 1943, pp. 17 [received 1949].

The most interesting part of this paper consists of illustrations and data on the lime content of peach and pear soils as affecting the incidence of chlorosis. Among data derived from Italian orchards are the following:—The lime content, expressed as calcium carbonate, of the soil of healthy pear and peach orchards varies from 0 to 15%, lying mainly between 1·5 and 5%. In chlorotic orchards the content varies from 3·6% upwards, being mainly between 6 and 30%. The incidence of chlorosis is not, however, necessarily related to a high lime content, though this is a predisposing factor which usually accompanies the trouble without being its chief cause. In healthy orchards the soil pH varies from 6·8 to 7·2, in chlorotic orchards from 7 to 7·6 and even higher. There would appear to be no relation between pH and calcium carbonate content. Susceptibility to chlorosis varies considerably with variety.

2860. Schipdam, G. J., and Vlasveld, W. P. N.
Kopergebrek bij vruchtbomen. **(Copper deficiency in fruit trees.)**
Fruitteelt, 1949, **39**: 572-5.

A disease causing serious losses in apple and pear orchards in the province of Drente, Holland, is attributed to copper deficiency. The disease has been noted also on plum and medlar, but not on black currants interplanted with diseased apples. The symptoms are the death of terminal shoots, with the result that side shoots grow out abnormally long and the trees become very bushy. These symptoms were noted as being similar to those of diseases of apple in Australia and citrus in California shown to be due to copper deficiency. In experiments carried out by the authors in 1947, rows of apple trees given copper sulphate as fertilizer had less disease than control rows, but in 1948 experiments were inconclusive, the control trees also remaining healthy.

2861. Tsuin Shen, and Hsiang Tseng.
Preliminary studies on a chlorotic disorder of fruit trees in Peiping associated primarily with a deficiency in iron.*
Proc. Amer. Soc. hort. Sci., 1949, **53**: 11-12.

Observations and spray and injection experiments indicate that iron deficiency is the main trouble with possibly incipient zinc and manganese deficiencies as a complication.

2862. Bould, C., and Tolhurst, J.
Report on the use of foliage sprays for the control of magnesium deficiency in apples.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 51-8, bibl. 5.

Experiments were carried out in 1946, 1947 and 1948 on Cox's Orange Pippin in the Pershore district and on Laxton's Superb trees which were showing stunted growth or signs of deficiency. The authors draw three main conclusions:—(1) that early foliage sprays are more effective than late sprays in raising the magnesium status of the leaf, (2) that three to four foliage sprays of a 2% solution of magnesium sulphate, the first at petal fall and the rest at fortnightly intervals, are sufficient to raise the magnesium status of the leaf from

* Abstract of paper to be published in *Acta Agriculturae* of the College of Agriculture, National Tsing Hua Univ., Peiping.

a deficiency level to normal and to suppress the development of magnesium deficiency symptoms, (3) that over a period of two years soil application of magnesium sulphate, under the conditions described, failed to influence either the magnesium status of the leaf or the incidence of magnesium deficiency symptoms. The effects of adding magnesium sulphate to the lime-sulphur spray were also tested and are discussed. The great importance of using a wetting agent such as Estol H or sulphonated lorol is stressed. In the absence of such an agent leaf damage will occur.

2863. CLULO, G.
The production of internal bark necrosis of apple in sand and soil cultures.
Abstr. in *Phytopathology*, 1949, **39**: 502.

This disease was produced at the end of the first growing season by adding 64 or more p.p.m. manganese in the form of manganous sulphate to sand cultures. When $Ca(OH)_2$, $CaCO_3$, $MgCO_3$, MgO, or NaC_2O_3 was added to disease-producing soil in the greenhouse, the development of the disease was prevented for the duration of the experiments (5 years). Trees planted in the orchard in soil treated with $Ca(OH)_2$ have not become diseased in 10 years.

2864. BAKER, C. E.
Further studies of the effectiveness of organic mulches in correcting potassium deficiency of peach trees on a sandy soil.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 21-2, bibl. 1.

Peach trees showing potassium deficiency on a sandy loam in 1946 were mulched with manure, straw and soybean hay in the late summer. They made vigorous and normal growth both in 1947 and 1948.—Lafayette, Indiana.

2865. WADE, G. C.
" Little leaf " of apples.
Tasm. J. Agric., 1949, **20**: 101-2, bibl. 1, illus.

Little leaf has been shown to be due to zinc deficiency in two districts of Tasmania. It can be controlled by spraying in the late winter (August) with a solution of 50 lb. of zinc sulphate in 100 gal. water, applied when no rain is expected for a few days.

Climatic factors.

(*See also* 2720, 2721.)

2866. FRITZSCHE, R.
Trockenschäden an Obstbäumen. (**Drought injury to fruit trees.**)
Schweiz. Z. Obst- u. Weinb., 1949, **58**: 333-7.

In Switzerland the severe drought of the summer of 1949 caused various types of injury to fruit trees, symptoms of which are described and illustrated. Scorching of pear leaves is particularly widespread, especially in areas where gales occurred during periods of intensive sunlight. The entire foliage may be destroyed in this way.

2867. KASJJANENKO, A. I.
Rootstock effect on the frost resistance of sweet cherry trees. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 5, pp. 17-18.

Severe damage to sweet cherry trees caused by the spring frosts of 1947 at Melitopol (Ukraine) is described. Figures are given to show the differences in temperature at soil level and at 2 m. above the ground. Data are tabulated to show the degree of damage on trees of four varieties worked on 3 forms of " Antipka ", 3 varieties of sour cherry and 3 varieties of sweet cherry. The least damage was on the trees worked on " Antipka ".

2868. MURSELL, P.
Late frost and orchard heating [in Britain].
Grower, 1949, **32**: 25, 27, 29, 31, illus.

The following points are briefly considered in relation to the question of whether or not to use orchard heaters: what proportion of the farm is susceptible to normal spring frosts; is the area suitable for heating; is the potential crop per acre sufficiently great; is the labour required in lighting and refuelling a limiting factor; the lowered morale of workers where crop is lost through frost. Capital and recurrent costs, organization, the electric alarm, and when to light are also discussed. With 60 heaters per acre burning about ½ gal. of heater oil (at 9¾d. per gal.) per hour, the cost per acre per hour for fuel alone is approximately 24s. The total capital cost per acre for 60 heaters, including 1,000 gal. of oil, would be about £77, which is expensive. The author considers that in frosty places this expense is preferable to the risk of suffering 15 months without a crop.

2869. KENNARD, W. C.
Defoliation of Montmorency sour cherry trees in relation to winter hardiness.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 129-33, bibl. 9.
Early defoliation of sour cherries in relation to winter injury.
Amer. Fruit Gr, 1949, **69**: 8: 19.

Premature defoliation of cherry trees in Pennsylvania is due to cherry leaf spot in particular and in lesser degree to fertilizer treatment, drought, viruses, insect and spray injury. Observations at State College showed that complete defoliation increased susceptibility to winter injury and delayed blossoming in the spring, the effect being more pronounced the earlier the occurrence of the defoliation. Fifty per cent. defoliation by 10th August did not increase low temperature injury. Nitrate of soda up to 350 lb. per acre supplied on 1st August did not increase injury in trees 50% defoliated by 10th August, but did increase it on trees completely defoliated then.

2870. ROMANOVA, E. G.
Frost-resistant roots of vine varieties.
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 6, pp. 16-19.

As viticulture in the U.S.S.R. extends to the north and east of the country, the use of frost-resistant rootstocks becomes more urgent. The situation is reviewed. The roots of different varieties have been examined to determine the relative amount of damage caused by low temperatures, and a table records the damage to roots found on 20 vine varieties after subjection in a cold chamber to temperatures of from $-5°$ to $-8°$ C.

2871. KROTKOV, A. A.
Protecting high-stemmed vines in unsheltered zones. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 9, pp. 15-17.
A method is described of growing vines with long stems (as opposed to stems cut back hard) in certain unsheltered parts of Russia. Each main stem is grown as a spiral (by training round a circle of stakes, later replaced by a stout pole) to a height of 1·5 m., then allowed to branch over a wire trellis.

2872. SKLJAR, N. I.
Restoring vineyards damaged by frosts. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 9, pp. 5-8, illus.
The damage to branches and buds of vines, caused by severe frosts in January, 1940, in the Krasnodar region of South Russia, is described. The methods adopted for restoring vines to productivity in various areas are mentioned. These include (1) uncovering and notching the base of the stem to induce growth from dormant buds, (2) pinching back terminals to stimulate the development of laterals, and (3) pruning and training.

2873. JONES, R. E.
Concord grape winter injury.
Bett. Fr., 1949, **44**: 1: 7.
Vineyards around Kennewick, Wash., suffered their first extensive winter injury in living memory during the winter of 1948/49. In an experimental vineyard 43·6% of the vines were damaged, of which 13·7% were killed entirely and 18·7% killed back to ground level. Possible causes of the exceptional susceptibility of the vines to frost damage are discussed.

2874. GRUBB, N. H.
Lightning damage to raspberries.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, p. 81.
Few, if any, of the plants in the affected area were killed outright, but nearly all were damaged. The leaves of all the fruiting canes tied to a wire support were severely scorched, the canes soon dried up and produced no fruit. Shorter fruiting canes which did not reach the wire were little or not at all injured.

2875. BOUGARD, M.
Coups de soleil sur des fruits en 1947. **(Sun-scald of fruits in 1947.)**
Fruit belge, 1949, **17**: 137-40.
Severe sun-scald of certain varieties of apple, pear, and plum in Belgium in 1947 is described. Resistant and sensitive varieties are mentioned. The apple trees on rootstocks I, XII and XVI appeared to be most resistant. No injury was observed on peach, apricot or Japanese plums (Burbank, Golden Japan) but grapes and gooseberries were damaged.

2876. FARNHAM, R. B., AND OTHERS.
Storm injured trees.
Leafl. Ext. Ser. Rutgers Univ. New Brunswick, N.J., **13**, 1948, pp. 4, illus.
Simple, practical directions for the care of damaged trees and shrubs that will be of use to growers of ornamentals as well as to foresters.

2877. VAN DER LINDE, R. J.
Stuivende akkers en houtopstanden. **(Shifting soil in Holland.)** [English summary 2 pp.]
Reprint *Maandbl. Landb Voorlicht Dienst*, Nov., 1948, pp. 21.
An account of sand drifts in Holland and of the influence which shelter belts of standing crops less permanent than woods have upon the surrounding crops. It is considered that owing to their wind-breaking effect, more use might be made of such belts.

Viruses.

2878. VAN DER PLANK, J. E.
Vulnerability and resistance to the harmful plant viruses: a study of why the viruses are where they are.
S. Afr. J. Sci., 1949, **46**: 58-66, bibl. 10.
The presidential address to Sect. C, S. African Association for the Advancement of Science, 1949. Among other aspects of the subject, consideration is given to the virus diseases of budded or grafted fruit trees and the effects of vegetative propagation on the incidence of these diseases.

2879. VAN DER PLANK, J. E.
The relation between the size of fields and the spread of plant-disease into them. Part III. Examples and discussion.
Emp. J. exp. Agric., 1949, **17**: 141-7, bibl. 6.
The subject is discussed in relation to some particular problems, most of them African. Virus diseases seem generally to be crowd diseases, this being related to the mode of existence of the viruses. In succumbing to swollen-shoot virus, the West African cacao industry seems to be a victim of peasant agriculture. It is a condition for a useful result from making fields larger and correspondingly fewer that the rate of multiplication of infection within the fields should not be fast. It is probably too fast with most of the economically important fungi causing local lesions by airborne infection, and the use of larger fields is likely to be useful mainly against the movement into fields of infection causing systemic disease.—For abstracts of parts I and II, see *H.A.*, 18: 2522 and 19: 976.

2880. ATKINSON, J. D., AND CHAMBERLAIN, E. E.
Apple-mosaic in New Zealand.
N.Z. J. Sci. Tech., 1948, **30**, Sec. A, pp. 1-4, bibl. 8, illus.
A cream and yellow mottling of apple foliage in New Zealand appears to be apple mosaic caused by *Pyrus* virus 2. Infected trees have been observed in all the main apple growing areas, and in several outlying orchards. The disease has been seen in 39 varieties and 3 Malling rootstocks (IX, XII and XVI). Mosaic symptoms developed on 26 of 36 healthy apple seedlings budded with infected wood. [From authors' summary.]

2881. HUTCHINS, L. M., AND RUE, J. L.
Natural spread of phony disease to apricot and plum.
Phytopathology, 1949, **39**: 661-7, illus., abstr. Ibid. **39**: 503.
Natural spread of phony disease to seedling trees of two species of apricot and three species of plum were observed at Fort Valley, Georgia. The symptoms

were pronounced in common apricot (*Prunus armeniaca*), less marked in *P. hortulana* (Hortulan plum) and *P. mexicana* (big plum tree), highly indefinite in *P. mume* (Japanese apricot) and in *P. angustifolia* (chickasaw plum).

2882. THOMAS, H. E.
The strawberry virus complex.
Abstr. in *Phytopathology*, 1949 **39**: 863.

Using *Fragaria vesca* var. *californica* as an indicator plant the viruses found in limited collections of strawberry plants, mostly Marshall variety, from Pacific Coast and Eastern United States, have been indexed, particularly with regard to the sets of symptoms termed "mottle" and "droop." Symptoms of xanthosis in indicator plants were more severe than either mottle or droop.

2883. ANON.
Au sujet du court-noué. **(Court noué, a suggestion.)**
Vitic. Arboric., 1949, **95**: 75-6.

The writer utters a plea for the establishment of a plantation or plantations with one sole purpose, namely the determination by the grafting method whether a vine showing the accepted symptoms of court noué is really affected with the infectious degeneration virus or is suffering from the effects of some non-virus agent such as faulty manuring. [It is obvious from recent articles that the decision of the International Commission in 1948 that in future court noué should be called "infectious degeneration" has not solved the problem of the identity of all the symptoms formerly designated "court noué". These symptoms are so numerous that a grafting test would certainly appear likely to decide at least whether a virus is their cause and so whether the phenomenon can rightly be termed "infectious degeneration".]

Bacteria.

(*See also* 2888, 3526.)

2884. POWELL, D.
Bacterial spot of peach.
Ill. Hort., 1949, **38**: 3: 6-7.

There is no evidence for the belief that the elimination of arsenicals, or rather of its "safeners", zinc sulphate and lime, from the spray programme has aggravated the position. At present no cure is known for bacterial spot of peach.

2885. VEERHOFF, O., AND CLAYTON, C. N.
Foliage retention of peach varieties in the North Carolina Sandhills.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 37-9, bibl. 3.

The factors responsible for premature leaf shedding of peach trees in parts of N. Carolina are discussed. They include infection by *Xanthomonas pruni* and possibly inherited susceptibility to this bacterial spot disease.

Fungi.

(*See also* 2869, 3543.)

2886. MILLER, P. W., AND SCHUSTER, C. E.
Walnut tree decline and loss in the Pacific Northwest: causes and control.
Stat. Bull. Ore. agric. Exp. Stat. **453**, 1948, pp. 20, illus.

This bulletin describes diseases caused by *Armillaria mellea* and by wood rots, and non-parasitic disorders, viz. girdle (" black-line ") of grafted walnuts, boron deficiency, poor soil drainage, cold injury, insufficient soil fertility and insufficient moisture. Boron deficiency, one of the more important non-parasitic causes of decline of walnuts in the Pacific North-west, is treated more fully than the rest. Leaves, shoots, and nuts are affected. On the leaves, large, irregular, dark brown spots develop between the veins (the " scorch " of growers), and long leafless shoots are frequently produced in the tops of the trees. The nuts do not " set " normally, and many drop off when they are about the size of peas. To control this disorder boron may be applied to the soil, by spraying solutions on to the trees, and by injection or inserting capsules containing crystals of boric acid into holes bored into limbs. For soil applications, for 18- to 25-year-old trees, 4 to 6 lb. of borax per tree are required. A spray solution is made by dissolving 2 lb. of boric acid in 100 gal. water. To reduce foliage injury, which often follows the application of boric acid solution, it is advisable to add 1 quart of summer oil emulsion to every 100 gal. of the solution. Two applications of this mixture should be made, the first in the late pre-blossom stage and the second in the early post-bloom stage.

2887. CROWDY, S. H.
A progress report on the effect of organic chemicals on the healing of wounds on apple trees.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 155-60.

The author considers that two main points of interest emerge from the present series of trials, (1) confirmation to a large extent of the finding that the compounds which checked the spread of *N. galligena* cankers were also those which were able to stimulate healing. The behaviour of bis (2-naphthoxy) acetic acid provides a striking exception to this, but this result may be due to an excessive dose. In the second place there is indication that the inclusion of plant growth substances in wound dressings may be definitely advantageous and that it may be possible to choose dressings which actively encourage healing instead of aiming only at low phytotoxicity [see *ibid. for 1947*, p. 158; *H.A.*, 18: 2566].

2888. MILLER, P. R.
Apple scab control by eradicant fungicides.
Agric. Chemls, 1949, **4**: 9: 47-9, 77-9.

These comments on the control of apple scab and peach diseases are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, etc., Beltsville. The portion on peach deals with the effectiveness of sodium hypochlorite against bacterial spot (*Xanthomonas pruni*) and brown rot.

2889. MCKAY, R.
Some observations on plant diseases in Ireland in 1947.
J. Dep. Agric. Éire, 1948, **45**: 45-50.

Including potato blight, apple scab, leaf spot (*Pseudopeziza ribis*) of red currants and gooseberry and bacterial canker of tomato (*Corynebacterium michiganense*).

2890. MARSH, R. W.
A supplementary note on fruit spraying with a glyoxalidine preparation in 1948.
J. hort. Sci., 1948,* **24**: 284-7, bibl. 4.
In a season favourable to apple scab attack, spraying Worcester Pearmain trees four times with a preparation of glyoxalidines reduced the amount of leaf infection by 90% and of fruit infection by 80% compared with that on unsprayed trees. On the leaves, the glyoxalidine treatment provided significantly better scab control than that given by the standard lime-sulphur spray programme. The glyoxalidine sprayings resulted in no damage to the foliage or fruit of the Worcester Pearmain trees. Three heavy sprayings with the glyoxalidine preparation caused negligible foliage damage on Cox's Orange Pippin. The value of glyoxalidine for the control of *Pseudopeziza ribis* on black currant was confirmed. [Author's summary.]—Long Ashton Res. Stat., Bristol.

2891. D'OLIVEIRA, B., AND D'OLIVEIRA, M. DE L.
Nota sobre os *corpos M* do tricoginio e do anteridio nas *Venturia inaequalis, V. pirina* e *V. eriobotryae*. **(Note on the " M bodies " of the antheridium and trichogyne of *Venturia inaequalis, V. pirina* and *V. eriobotryae*.)** [English summary 1 p.]
Agron. lusit., 1946, **8**: 291-301, bibl. 13, illus. [received 1949].
A cytological study of certain phenomena which occur during fertilization in three fungi responsible for apple, pear and loquat scab.

2892. DARPOUX, H., AND VUITTENEZ, A.
Essais de traitements contre la tavelure du poirier. **(Trials for the control of pear scab.)**
Ann. Épiphyt., 1948, **14**: 7-26, illus.
In field experiments (starting in mid-April) with various preparations, bordeaux mixture gave the most constant results, copper oxychloride being rather less effective, while micronized sulphur at 1% gave results approaching those of bordeaux. Application about the middle of March using 2% formaldehyde, bordeaux mixture (4% copper sulphate), lime-sulphur 4: 100, and 4% anthracene oil reduced the number of scab spores, the results suggesting that if these substances are applied before bud-break they will help in controlling scab.

2893. MOORE, M. H.
Note on the association of *Botrytis cinerea* with an apple canker, and with various symptoms on sundry other hosts.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, p. 101, illus.
The association of *Botrytis cinerea* with cankers on young apple trees and with rotting of flowers, fruit and shoots of various cultivated plants is noted.

2894. BYRDE, R. J. W.
Experiments on the control of brown rot of fruits: progress report, 1947-48.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 161-73, bibl. 10.
In trials at Reading University Horticultural Station winter application of a phenyl mercury chloride preparation or of a calcium arsenite mixture inhibited spore formation on mummified apples and plums infected with *Sclerotinia fructigena*. Preparations of copper naphthenate showed no such fungicidal effect. A late June spray of another phenyl mercury chloride preparation resulted in an approximately three-quarters reduction in the current season's brown rot infection of plums in a small-scale trial; lime-sulphur showed a lesser degree of control. [Author's summary.]

2895. THIND, K. S., AND KEITT, G. W.
Studies on variability of *Sclerotinia fructicola* (Wint.) Rehm.
Phytopathology, 1949, **39**: 621-36, bibl. 11, illus.
The 8 monoascosporic lines from each of 36 asci, from apothecial material received from the States of Washington, Illinois, and Michigan in 1947, when plated singly on potato-dextrose agar at 24° C., were differentiated into 4 distinct pairs on the basis of colony characters.—University of Wisconsin, Madison.

2896. STEENLAND, A. P.
Brown rot following peach leaf curl in Oregon.
Plant Dis. Reptr, 1949, **33**: 203-4.
The author states that this is believed to be the first report of sporodochia of *Sclerotinia laxa* on leaves. [But see *H.A.*, 11: 77.]

2897. BERTELLI, J. C.
Histopatologia de las lesiones gomosas del duraznero (*Prunus persica* Sieb. et Zucc.). **(The gumming of peach trees: a histological study.)** [English summary.]
Rev. Asoc. Ingen. agron. Montevideo, 1948, **82**: 9-34, bibl. 7, illus.
The present paper studies the changes in the composition of the cells and the morbid processes which take place in the lesions caused by *Phomopsis* sp., *Cladosporium carpophilum, Ascospora beierinkii, Laspeyresia molesta, Scolytus rugulosus*, hail, and other agents. It also studies the different gums which compose the wound-gum in the different tissues affected. It is concluded that the gumming of peach trees is a normal reactionary-defensive process, and its successful control requires a knowledge of the cause.

2898. MCCLELLAN, W. D., AND CHRISTIE, J. R.
Incidence of *Fusarium* infection as affected by root-knot nematodes.
Phytopathology, 1949, **39**: 568-71, bibl. 4.
Under the conditions of the experiments *Heterodera marioni* had very little, if any, effect on the incidence of *Fusarium* infection.—Plant Industry Station, Beltsville, Maryland.

2899. ZOBRIST, L.
Roter Schleimfluss an Direktträger-Reben. **(The formation of red mucus on direct-producer vines.)**
Schweiz. Z. Obst- u. Weinb., 1949, **58**: 306-7.
The 10-20 cm. long, slimy, red spots observed on vines after pruning were diagnosed as *Fusarium merismoides* mycelia growing on the exuding sap. In dry weather the jelly-like mass dries up and forms a crust on the shoot, which may prevent the buds from growing out.

* Appeared August, 1949.

Cutting the shoot farther back is no remedy, since the trouble is liable to recur. Experiments are being carried out to determine whether dormant spraying is a suitable control measure.

2900. HILDEBRAND, E. M.
Slime mold on strawberry in Texas.
Plant Dis. Reptr, 1949, **33**: 301-2.

A slime fungus, *Diachea leucopoda*, was found growing from the soil up the surface of the plants, involving half or more of the leaf surface and seriously affecting their vitality. The occurrence was coincident with cool, humid weather and on plants growing on a rich soil containing an abundance of organic matter.

2901. BERNON, G.
Le mildiou dans le midi de la France en 1948. **(Vine mildew in the south of France 1948.)**
Progr. agric. vitic., 1949, **132**: 181-9, 209-15, 231-7, illus.

In relation to a serious outbreak of vine downy mildew in the south of France in 1948, causing great losses in some departments, the author discusses the conditions which favour such attacks and (in general terms) the control of mildew.

2902. TRECCANI, C. P.
Prove di lotta contro la peronospora della vite con poltiglia bordolese attivata da polisolfuro di calcio. **(Control of vine mildew by bordeaux mixture activated with lime-sulphur.)** [English summary 10 ll.]
Ann. Sper. agrar., 1949, **3**: 673-90, bibl. 6.

Experiments in Northern Italy in 1944, 1946, 1947, and 1948, both in the laboratory and the vineyard, were devised to test the value of adding lime-sulphur to the ordinary bordeaux mixture for the control of vine mildew. The plots do not appear to have been randomized. The conclusions drawn are that a considerable improvement in control can be expected by the addition. The bordeaux is prepared first and the lime-sulphur added to it. In years of fairly strong infection bordeaux at 0·7% with the addition of lime-sulphur at 25 Bé at 2·3% proved satisfactory.—Staz. sper. Ortofrutt. Milan.

2903. MOREL, G.
Méthode d'essai en serre des produits de lutte contre le mildiou de la vigne. **(Method for greenhouse trials of products for the control of vine downy mildew.)**
Ann. Épiphyt., 1947, **13**: 57-66, bibl. 18, illus. [received 1949].

A method is described for testing fungicides against vine downy mildew (*Plasmopara viticola*) in the greenhouse. It involves (1) obtaining cultures of the fungus, *in vitro*, on vine callus tissues and using it as a source of spores, (2) raising young plants for spraying and inoculation, (3) the application of the fungicides to be tested, and (4) inoculating the sprayed plants with mildew spores produced as in (1).

2904. HAHN, G. C., AND MILLER, A.
Rust immunity of Canadian black currants under field conditions in Connecticut.
Plant Dis. Reptr, 1949, **33**: 275-6.

Two clonal selections of Canadian black currants (*Ribes ussuriense* Janez. ♂ × *R. nigrum* L. ♀) remained completely free from blister-rust (*Cronartium ribicola*) while gooseberry control bushes in the vicinity were heavily infected.

2905. GROSJEAN, J.
Omvang en verloop van de loodglansziekte bij een aantal pruimenrassen in de Betuwe gedurende de jaren 1941 tot en met 1946. **(Incidence of the silver leaf disease in a number of varieties of plum grown in the Betuwe during the years 1941-1946.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1949, **55**: 212-21.

Observations on the incidence of silver leaf disease in plum varieties in the Betuwe district of Holland during 1941-1946 showed that over this period the disease increased in Victoria, Early Laxton, Belle de Louvain, Early Orleans and Early Rivers, and decreased in Doyenné, Reine Claude d'Althann and Jefferson. In Reine Claude d'Oullins the disease remained nearly at the same level. In Czar it reached a very pronounced maximum in 1943 and then decreased.—Laboratorium voor Mycologie, Wageningen.

Nematodes.

2906. MACHMER, J. H.
Soil fumigation for the control of the root-knot nematode in peach, fig, and grape plantings.
Abstr. in *Phytopathology*, 1949, **39**: 498.

Trees planted on sites fumigated with chloropicrin grew more vigorously and had greater crops over a four-year period than trees planted on untreated sites.

2907. ELLIS, D. E., CLAYTON, C. N., AND OWENS, R. G.
Effects of soil treatments with Uramon and certain fumigants upon plant growth and incidence of root-knot.
Phytopathology, 1949, **39**: 590-7, bibl. 12, illus.

Root-knot, caused by *Heterodera marioni*, is a serious problem in home gardens and commercial plantings in North Carolina, and an important factor in the establishment of new peach orchards. The plants used in the various tests described included snap bean, tomato, okra and peach. In the field experiments, root-knot was effectively reduced and yields of tomato were markedly increased by soil treatment with Uramon, chloropicrin, D-D, ethylene dibromide, or ethylene chlorobromide. Uramon, at rates as low as ¼ lb. per sq. yd., applied in the fall to heavily infected light sandy soil prior to planting in the following spring, usually resulted in increased growth and yield.

2908. SERR, E. F., AND DAY, L. H.
Lesion nematode injury to California fruit and nut trees, and comparative tolerance of various species of Juglandaceae.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 134-40, bibl. 1.

Lesion nematode (*Pratylenchus pratensis*) is causing serious injury to fruit and nut trees in several fruit districts in California. Extensive trials to determine resistance or tolerance of many species are under way. Preliminary tests of 12 species and hybrids of Juglandaceae have indicated that Paradox walnut hybrids

(*Juglans*) and wingnuts (*Pterocarya*) have either a high degree of resistance to, or marked tolerance of, the lesion nematode in the situations where tested. [Authors' summary.]

Mites and insects.

(*See also* 2653, 3519.)

2909. LEEFMANS, S.
Over het belang van de kennis der diapauze en phaenologie der insecten. (The importance of a knowledge of the diapause and phenology of insects.)
Landbouwk. Tijdschr., 1949, **61**: 473-89, illus.

How such knowledge can be used to advantage in insect control is discussed. Practical illustrations are given of how it may affect sowing times and times of application of insecticides for various horticultural crops.

2910. MASSEE, A. M.
Notes on some interesting insects observed in 1948.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 102-7, illus.

These notes include mention of *Apion* spp. feeding on apple foliage, cockchafer larvae feeding on hop roots, weevils attacking strawberry roots, and earwigs feeding on peach fruits.

2911. JONES, M. P.
4-H club insect manual.
Misc. Publ. U.S. Dep. Agric. **318**, 1949, pp. 64, illus.

A handy, profusely illustrated brochure of general entomology with notes on collection and identification and a section on life studies and control measures.

2912. BORG, Å.
Ett vinterbesprutningsförsök mot blodlusen och ett par andra skadeinsekter. **(Winter spraying against woolly aphid and some other pests.)**
Växtskyddsnotiser, 1949, No. 1, pp. 4-6.

Winter spraying against woolly aphid with 4 ovicides reduced the average number of colonies present in the middle of June on scraped and unscraped trees from 10·8 and 6·4 to 2·0 and 1·3 respectively. The trials were less successful in the case of the small ermine moth (*Hyponomeuta malinellus*) and of the lackey moth (*Malacosoma neustria*).

2913. BORG, Å.
Begasningsförsök med cyanväte mot blodlusen. **(Woolly aphid control by HCN fumigation.)**
Växtskyddsnotiser, 1949, No. 2, pp. 9-13.

Preliminary trials showed that during the dormant period apple trees can be safely fumigated with HCN for a period not exceeding 6 hours at concentrations ranging from 0·08 to 0·1 vol. %. The treatment was effective.

2914. O'NEAL, E. J., AND FLUKE, C. L.
Tests with DDT against active nymphs of oyster shell scale.
J. econ. Ent., 1948, **41**: 978-9.

Commercial and experimental treatments of apple trees with dormant oil sprays did not give satisfactory control of oyster shell scale (*Lepidosaphes ulmi*) in Wisconsin orchards. The tests indicated, moreover, that the use of dormant oil greatly reduced parasitism of the scale. Several post-dormant sprays were tested. A DDT 50% wettable powder spray at 2 lb. per 100 gal. gave very good control when applied at the "crawler" stage.—Univ. Wisconsin, Madison.

2915. BARNES, D. F.
Control of the fig scale in California.
J. econ. Ent., 1949, **42**: 48-55, bibl. 3.

Fig scale (*Lepidosaphes ficus*) infestation was controlled by 2% light summer-oil sprays put on in May, when first-brood crawlers were still settling and before any of the summer scales were mature. [From author's summary.]

2916. ASQUITH, D.
European fruit lecanium on peach following applications of DDT.
J. econ. Ent., 1949, **42**: 147-8.

The blackening of peaches resulting from honey dew secretions of *Lecanium corni* was checked by applications of nicotine sulphate.

2917. VASSEUR, R., AND BIANCHI, H.
Quelques données nouvelles sur la lutte chimique contre le pou de San-José (*Quadraspidiotus perniciosus* Comst.). **(New facts about the chemical control of the San-José scale insect.)**
C.R. Acad. Agric. Fr., 1949, **35**: 280-2,

Yellow oil (67% mineral oil, 2% DNOC) at 2% is completely effective as a winter treatment against the San-José scale. Good results were also obtained with 1% white oil containing DDT (0·1% of the active ingredient).

2918. ALEKSIDZE, N. E.
The control of the leaf form of phylloxera. [Russian.]
Vinodelie i vinogradarstvo (Wine-making and viticulture), 1949, No. 6, pp. 19-21.

From the results of experiments described the author concludes that phylloxera infestation of vine foliage can be largely prevented by earthing up the plants in winter, covering the head with 12 to 15 cm. of soil and (as the hill tends to become flattened during the winter) restoring the height in spring. This procedure prevents the phylloxera from laying its eggs on the base of the stems.

2919. FRÉZAL, P.
Destruction des phylloxéras gallicoles. **(Control of leaf-gall by phylloxeras.)**
Ann. Inst. agric. Algér., 1948, **4**: 4: 1-8, bibl. 15.

Attacks of the gall-forming phylloxera can be controlled by 2 applications of dusts containing 10% HCH, one when the first galls show, the other a month or a month and a half later.

2920. COLLYER, E.
The predator aspect of the fruit tree red spider problem.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 108-10.

The biology of *Blepharidopterus angulatus* (Fall.),

the black-kneed capsid, is outlined and five other predators of the fruit tree red spider mite found in Essex and Kent orchards are mentioned. The effect of the predators on spraying programmes is discussed. An appendix lists the predators (34+others not specified) of the fruit tree red spider found in Essex 1944-48.

2921. CHAPMAN, P. J., AND PEARCE, G. W.
Susceptibility of winter eggs of the European red mite to petroleum oils and dinitro compounds.
J. econ. Ent., 1949, **42**: 44-7, bibl. 2, being *J. Pap. N. York St. agric. Exp. Stat.* **784**.
Susceptibility of the eggs increased as the interval between spraying time and hatching was reduced. An efficiency of only 91·6% was obtained with a 3·0% oil spray applied 39 days before hatching or in the full dormant period. Essentially this same kill, 90·2%, was realized with only 0·25% oil in a spray applied at the beginning of hatch. A product containing dinitro-*o*-cresol as the chief toxic agent proved ineffective. At a 0·5% concentration, a formulation containing 36% of the triethanolamine salt of dinitro-*o*-secondary butyl phenol, gave 97·2% control. [From authors' summary.]

2922. BREAKEY, E. P., AND BATCHELOR, G. S.
The willamette mite, a pest of raspberries in the Puyallup Valley.
J. econ. Ent., 1948, **41**: 987-8.
The mite, *Tetranychus willamettei*, became a serious problem for raspberry growers of the Puyallup Valley in 1947, as a result of the unwise use of DDT against orange tortrix. Tests to determine the effectiveness of dinitro compounds and HEPT as acaricides, especially in combination with some of the newer insecticides, are reported. DN-111 gave good results when used with cryolite or DDD, but its efficiency was reduced when used with DDT or dimethoxytrichloroethane. A formula containing 25% HETP also showed promise.—State College of Washington.

2923. OMAN, P. W.
A leafhopper injurious to cultivated prune in the Western United States.
J. econ. Ent., 1948, **41**: 983, bibl. 11.
The leaf hopper *Typhlocyba prunicola* is becoming a more important pest in the western United States. Notes on its distribution and relevant literature are given.

2924. DICKER, G. H. L.
The apple blossom weevil.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, p. 152.
Describes good results obtained by adding DDT to winter washes for the control of apple blossom weevil.

2925. MILLER, L. W.
The green beetle—a pest of berry fruits.
Tasm. J. Agric., 1949, **20**: 106-8, bibl. 4.
The life history and habits of the green beetle *Diphucephala colaspidoides* Gyll are outlined. Tests have shown that this pest can be controlled by 0·1% DDT emulsion applied once as soon as the beetle appears.

2926. JANJUA, N. A., AND MEHRA, R. N.
The biology of *Quettania coeruleipennis* Schwarzer (Coleoptera) in Baluchistan.
Bull. ent. Res., 1949, **40**: 203-6, bibl. 3.
The biology of the Cerambycid, *Quettania coeruleipennis*, a serious pest of almond and pomegranate in Baluchistan, is described. The larvae attack the top shoots and small branches, tunnelling downwards; the attacked branches ultimately become hollow and dry up. [From authors' summary.]

2927. DELANOUE, P.
Un parasite nouveau de l'abricotier en Tunisie: *Stenopterus ater* Lin. **(A new enemy of apricot in Tunisia.)**
Bull. Serv. bot. agron. Tunis No. **4**, 1946, pp. 8, bibl. 3, illus. from abstr. in *Rev. appl. Ent.*, 1949, **37**: 223.
Withering of the leaves and drying of the wood on one or more branches of apricot trees in Tunis appear to be caused by *Stenopterus ater*. The larvae, pupae and adults of this Cerambycid are described. The larvae bore in the wood and apparently prevent the transmission of sufficient sap when the fruit has set.

2928. ROEHRICH, —., AND GUIBERT, R.
Sur les dégats occasionnés par deux coléoptères: la grande cistèle rousse (*Omophlus lepturoides* L.) et l'eumolpe (*Adoxus obscurus* L.) en Charente-maritime.
(On the damage caused by two coleopterous insects, *Omophlus lepturoides* and *Adoxus obscurus*.)
C.R. Acad. Agric. Fr., 1949, **35**: 282-4.
Damage is recorded caused by *Omophlus lepturoides* to vine flowers, fruit and leaves of cherry, and young apples, and by *Adoxus obscurus* to the fruit and leaves of hybrid vines. Good control was obtained by preparations containing SNP, HCH, and DDT.

2929. SNAPP, O. I.
New insecticides for plum curculio control—second report.
J. econ. Ent., 1949, **42**: 7-11, bibl. 2.
In orchard experiments benzene hexachloride and parathion were effective for the control of the plum curculio when the results were measured by the infestation in peach drops. Benzene hexachloride and parathion applied on peach drops prevented many plum curculio larvae from maturing, but chlordan was not so effective. Benzene hexachloride (6% gamma) at 4 lb. per 100 gal. applied on 22nd March, 5th April, 19th April, and 31st May, the last application being 4 weeks before harvest, did not affect the flavour of the ripe fresh peaches. No injury to peach fruit, foliage, wood, or buds resulted from sprays of benzene hexachloride, chlordan, toxaphene, or parathion. Lead arsenate caused about the usual amount of injury. [From author's summary.]—For an abstract of the first report, see *H.A.*, 19: 1995.

2930. BOBB, M. L.
Hibernation of the plum curculio in Virginia.
J. econ. Ent., 1949, **42**: 19-22, bibl. 8.
The majority of the plum curculio adults hibernate in the second and third inch soil layers in Virginia. The adult beetles begin to emerge in the spring when the

mean soil temperature at 3 inches has reached approximately 50° F. Burning of woodlands during the winter is of no value in plum curculio control. Early spring burning will kill many beetles and may be of value in cases of very heavy infestation. [From author's summary.]—Virginia Agric. Exp. Stat. Charlottesville.

2931. Hough, W. S.
Chlordan compared with parathion on plums.
J. econ. Ent., 1948, **41**: 983-4.
Chlordan proved highly toxic to plum foliage and buds when applied at the time the plum curculio is active in Virginia. On the other hand, parathion appeared to be a promising insecticide for control of this pest on plums.—Virginia Agric. Exp. Stat., Winchester.

2932. Thiem, H.
Zur Weiterentwicklung der praktischen Maikäfer- und Engerlingsbekämpfung. **(Cockchafer and white grub control.)**
Reprinted from *Anz. Schädlingsk.*, 1948, **21**: 17-21, bibl. 3, and 1948, **21**: 51-4.
E605 and, to a somewhat lesser extent, benzene hexachloride, proved effective against cockchafers and their larvae. Protective spraying of orchards against the chafers must be left to the growers, while the protection of woods and other broad-leaved trees should be the responsibility of the plant protection service. Watering vegetable plants, nursery trees and vines with a 0·05% solution of E605 gave better control of white grubs than did benzene hexachloride. Preliminary data are presented.—Inst. of fruit and vegetable growing at the biol. Zentralanst., Heidelberg/Wiesloch, Germany.

2933. Langford, G. S., and Gilbert, E.
The value of phenyl ethyl acetate as an ingredient in Japanese beetle baits.
J. econ. Ent., 1949, **42**: 146-7.
Standard anethole-eugenol baits were greatly improved by the addition of phenyl ethyl acetate.

2934. Fleming, W. E.
Chlordan for control of Japanese beetle larvae.
J. econ. Ent., 1948, **41**: 905-12, bibl. 1.
Chlordan is 70 times as toxic as DDT and 7,000 times as toxic as lead arsenate to larvae of Japanese beetle (*Popillia japonica*). An application of 10 lb. per acre controlled infestations in turf and nursery beds, and had no harmful effect on the common grasses, evergreen nursery stock or most of the vegetables, strawberry varieties or annual flowers tested. Growth of celery, cucumber, squash, oriental poppy, snapdragon and Massey strawberry, however, was retarded by this treatment.—U.S.D.A. Bureau of Ento. and Pl. Quar.

2935. Cook, W. C.
Comparative studies of three soil fumigants for wireworm control.
Tech. Bull. U.S. Dep. Agric. **980**, 1949, pp. 22, bibl. 14, illus.
Ethylene dibromide at 2 gal. per acre, dichloronitraethane at 5-10 gal., or chlorinated propane-propylene at 25 gal. have given excellent results in Washington against wireworms.

2936. Swan, D. C., and Browning, T. O.
The black field-cricket (*Gryllulus servillei* Saussure).
J. Dep. Agric. S. Aust., 1949, **52**: 323-7, bibl. 11, illus.
When the black field-cricket, usually a solitary insect, reaches swarming numbers it may cause damage to pastures, market crops, or fruit trees. Its life history and habits are described. It is shown to have a close association with black clay (rendzina) soil. Poisoned bran baits (containing sodium arsenite or Gammexane) are mentioned as control measures.

2937. Böhm, H.
Untersuchungen über die Lebensweise und Bekämpfung der Kirschfliege. **(Biology and control of the cherry fly.)** [English summary 6 ll.]
PflSch. Ber. Wien, 1949, **3**: 177-85, bibl. 6.
In medium-late varieties two and three applications of DDT or parathion reduced cherry fly incidence from 88% to 10 and 4% respectively.—Bundesanst. f. Pflanzenschutz, Vienna.

2938. Hely, P. C.
Control of fruit fly [*Strumeta tryoni*] under backyard conditions. Value of nicotine sulphate baits.
Agric. Gaz. N.S.W., 1949, **60**: 143-6, bibl. 2.
A convenient method of making up the bait is to mix two small teaspoonfuls of nicotine sulphate (Blackleaf 40) in half a gallon of water in which 4 level tablespoonfuls of white sugar have been dissolved. For each baiting, half a pint of this solution is taken and half a spoonful of 20% DDT emulsion is stirred in. This mixture should be used at once.

2939. d'Aguilar, J., Dumont, L., and Milaire, H.
Sur des dégats commis dans les pépinières par la cécidomyie des greffes (*Thomasiniana oculiperda* Rubs.). **(The damage in nurseries caused by the red bud borer.)**
C.R. Acad. Agric. Fr., 1949, **35**: 183-4.
Severe infestations by the red bud borer [*H.A.*, 9: 775] were recorded in 1948 on shield-budded fruit trees of pear on quince, apple on doucin and paradise, peach on peach, and apricot on plums in nurseries around Lyons. The distribution of the pest in Europe is mentioned. It is suggested that control should be attempted by using substances (raffia, etc.) impregnated with one of the synthetic insecticides or repellants at the time of budding, in order to prevent egg-laying.

2940. Caldwell, N. E. H.
Codling moth control experiments, 1945-47 [Queensland].
Qd J. agric. Sci., 1948, **5**: 61-76.
In these experiments DDT, benzene hexachloride and zinc fluoarsenate were tested officially for the first time in Queensland. DDT at 0·1% concentration gave very satisfactory results when applied to the same cover spray schedule as lead arsenate. At half this strength, DDT was significantly less efficient though still superior to lead arsenate. The amount of DDT residue remaining on the fruit at harvest after the use

of the higher concentration was somewhat high. The risk of increased incidence of mites, and to a lesser extent, woolly aphid, following the use of DDT, was demonstrated. In various schedules white oil-DDT sprays effectively controlled both codling moth and red mite. When used alone, white oil gave indifferent control of codling moth. The depressing effect of oil on fruit size was illustrated. Benzene hexachloride sprays at 0·013 and 0·025% concentrations of the gamma isomer had little effect on codling moth infestation. Zinc fluoarsenate gave no better control of codling moth than lead arsenate when used at the same concentration. Hydrated lime+zinc sulphate was shown to have a valuable " safening " effect when added to the standard lead arsenate spray. Zinc sulphate caused appreciable fruit blemishing, but resulted in improved codling moth control whether added alone or with hydrated lime to lead arsenate. [From author's summary.]

2941. VASILYEV, V. P., AND SEREBIJANAJA, S. G.
DDT for the control of apple codling moth. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 35-6.

Experiments with DDT as a 5% dust and as emulsions (0·05-0·1% and 0·2-0·3%) are described for a region (in the Ukraine) where there are two generations of the pest per year, requiring 5 applications of arsenical insecticides during the season. The DDT dusts proved unsatisfactory, but the emulsions gave better control than calcium arsenate, and fewer applications were necessary. The amount of DDT present on the fruit at certain periods after application was determined and a warning is given that its toxic effect has not yet been fully studied.

2942. THIEM, H.
Über die Bedeutung der zweiten Generation des Apfelwicklers. **(The significance of the second codling moth generation.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 58-9.

In Central Europe, even in the relatively warm climate of Heidelberg, the second codling moth generation is of no practical importance.

2943. FRANSEN, J. J., AND NIEUWDORP, P.
De invloed van de voedselplant op de ontwikkeling van de ringelrups (*Malacosoma neustria* L.). **(The influence of the host plant on the development of the lackey moth larvae.)**
Meded. Dir. Tuinb., 1949, **12**: 404-5.

A short discussion of the subject, together with a table of data obtained from observations on some woodland and cultivated trees.

2944. ROSENSTIEL, R. G.
Life history and control of the orange tortrix in Oregon.
J. econ. Ent., 1949, **42**: 37-40, bibl. 9, being *Tech. Pap. Ore. agric. Exp. Stat.* **551**.

Life history and control studies were carried out in 1947 and 1948 against the orange tortrix. Its host list was extended to include raspberries, Youngberries, Boysenberries, Loganberries and blackberries. Larvae fed on the leaves and, as the fruit ripened, some of them bored into the berries. Chemical control tests in 1947 indicated that dichlorodiphenyl dichloroethane was effective. This was confirmed the following year in extensive field tests. DDT did not control the tortrix larvae. The hymenopterous parasite *Apanteles aristoteliae* was common. *Itoplectis obesus* and *Horogenes eureka* were also important in natural control. [From author's summary.]

2945. HAMILTON, D. W.
Oriental fruit moth control with DDT.
J. econ. Ent., 1949, **42**: 25-8, bibl. 5.

The merits and demerits of a heavy, early-season DDT schedule for oriental fruit moth control are discussed on the basis of one season's experiments.

2946. CONKLIN, J. G., AND WALKER, G. I.
Parathion in early spring applications for bud moth control [*Spilonota ocellana*].
J. econ. Ent., 1949, **42**: 153-4, being *Sci. Contr. N. Hamp. agric. Exp. Stat.* **122**.

Complete clean-up of heavily infested [apple] trees was obtained with a single application of parathion (25% wettable powder) used at the rate of 1·2 lb. per 100 gal. of water. The pre-pink stage of bud development would appear to be nearly ideal from the standpoint of spray-timing. [From authors' summary.]

2947. TASCHENBERG, E. F.
Evaluation of spray programs for the control of the grape berry moth, *Polychrosis viteana* Clemens.
Tech. Bull. N.Y. St. agric. Exp. Stat. **283**, 1948, pp. 70, bibl. 35, illus.

The grape berry moth is a native insect that attacks the blossom buds and fruit of wild and cultivated grapes. Its seasonal history, habits, types of injury, and economic importance are described. The application of two lead arsenate sprays fortified with nicotine sulphate and three of fixed nicotine was the most efficient treatment with regard to control of the insect, freedom from foliage and stem injury, and spray residue at harvest. Results of 3 years' tests indicate that DDT was superior to the other insecticides tested.

2948. GOULD, E., AND HAMSTEAD, E. O.
Control of the red-banded leaf roller [*Argyrotaenia velutinana*].
J. econ. Ent., 1948, **41**: 887-90.

It is claimed, as a result of trials at the W. Virginia Agric. Exp. Stat., that proper use of liquid dichlorodiphenyl dichloroethane, at 8 oz. per 100 gal., will eliminate all danger of leaf roller damage on apples. Toxaphene, at 1 lb. per 100 gal., and parathion at 4 oz. per 100 gal., were also toxic but gave less effective control. Lead arsenate and DDT were not satisfactory.

2949. KING, H. L., HUTSON, R., AND FARR, T. H.
The control of red-banded leaf roller with parathion.
J. econ. Ent., 1948, **41**: 976-7, bibl. 2.

In orchard trials carried out at Michigan State College, E. Lansing, parathion used at the rate of 0·6 lb. per 100 gal. gave excellent control of red-banded leaf roller (*Argyrotaenia velutinana*) on apples, but not significantly better than 3 lb. lead arsenate or 0·25 lb. parathion. DDT gave inferior control. Chemical

analyses indicated negligible residues of parathion 3 weeks after spraying, and no spray injury was observed.

2950. Glass, E. H., and Chapman, P. J.
Red-banded leaf roller problem in New York.
J. econ. Ent., 1949, **42**: 29-35, bibl. 4.
In New York, where the red-banded leaf roller is a serious problem, parathion gave outstanding results against the first brood at strengths as low as 4 oz. of wettable powder in 100 gal. DDT was also found to be very effective if timed correctly. Against second brood a single application of parathion was equal to two treatments with DDT. The tabulated results include data on the value of a few other insecticides.—New York State Agric. Exp. Stat., Geneva.

2951. Massee, A. M.
The apple sawfly and its control.
The Fruit Year Book 1949, R.H.S. Lond., pp. 91-3.
The apple sawfly (*Hoplocampa testudinia* Klug.) and the damage it causes are briefly described. For control, nicotine is recommended—nicotine (95-98%) 1 oz., spreader, water 12 gal.—applied at 80% petal-fall, or at petal-fall or within one week of those periods. DDT is not superior to nicotine, if as good, for sawfly control; when used after blossoming it will destroy beneficial insects and may result in heavy infestations of the fruit tree red spider.

2952. Bovey, P.
L'hoplocampe ou ver cordonnier des poires, *Hoplocampa brevis* Klug. **(The pear sawfly.)**
Rev. romande Agric. Vitic., 1949, **5**: 61-4, bibl. 7.
The biology of the pear sawfly was studied in the Swiss canton of Ticino, where it is abundant. Trials carried out on three varieties showed that the pest is controlled effectively by thorough spraying with benzene hexachloride or parathion at the usual concentrations. Applications should be timed immediately before the hatching of the larvae, which under the conditions of the experiment took place towards the end of the flowering period, when at least half the petals had dropped.

Other pests.

2953. Rees, W. J.
Achatina's odyssey. Ravages of a globe-trotting giant snail.
The Times, 27 Aug., 1949, No. 51,471, p. 5, illus.
This is an authoritative graphic account, by Dr. Rees of the British Museum (Natural History), of the distribution of, and damage to horticultural crops by, the giant African snail, *Achatina fulica*, which has a shell 5 in. long, a body of about 10 in., and weighs half a pound. Although mainly a scavenger it attacks living plants, particularly seedlings, flowering plants, vegetables, ornamental shrubs, and the leaves, flowers and fruit of fruit trees. Its spread eastward, by man's agency, from its native home in East Africa across the Indian and Pacific Oceans as far as San Pedro, California, is described and shown on a map. It has several natural enemies, including an Indian glow-worm (*Lamprophorus*), but its biological control is, as yet, in its infancy. Control measures mentioned are, limewash with a small admixture of calcium arsenite, and baits containing metaldehyde. Fruit trees can be protected with tarred bands fixed around the stems. Recent experiments indicate that the climate of Britain is too cold for *Achatina* to survive, for, to remain active and breed, it needs a minimum temperature of about 75° F. [This pest thrives only too well at very much lower temperatures in Mauritius.]

2954. Dahl, M. H.
Haregnav—midler derimod og heling af sårene. **(Hare damage to fruit trees—control measures and wound healing.)**
Erhvervsfrugtavl., 1949, **15**: 126-7, reprinted from *Försök och forskning*, 1948, Vol. **5**, No. 11.
Spraying with aluminium sulphate and iron chloride reduced hare damage only slightly, while ordinary routine spraying with winter carbolineum or Dytrol afforded a certain amount of protection. Wounds should be covered as soon as possible with oiled or otherwise impregnated paper.

2955. Baumgartner, L. L., and Powell, S. E.
Zinc dimethyldithiocarbamate-cyclohexylamine complex as a deer repellent applicable to agricultural crops.
Contr. Boyce Thompson Inst., 1949, **15**: 411-20, bibl. 9, illus.
Zinc dimethyldithiocarbamate-cyclohexylamine complex, now formulated with an adhesive by the B. F. Goodrich Chemical Co., Cleveland, under the trade name of Good-rite z.i.p., is unpalatable to deer and makes a good repellent. Vegetable crops, normally susceptible to serious deer damage, were grown to maturity in localities having high deer populations. Crops such as snapbeans, strawberries and fruit trees were protected from deer with applications of from 1 to 5% concentrations of the spray. Deer were deterred only from food treated with the repellent, hence it is necessary to make repeated applications in order to keep the new growth covered.

2956. Hayne, D. W.
Tests of repellents for protecting gardens against cottontail rabbits.
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 434-40, bibl. 7.
The comparative ability to protect gardens from cottontail rabbits, *Sylvilagus floridanus mearnsii*, is reported for 26 materials as observed in pen and field trials. Highest ranking in protective ability are preparations of nicotine, tobacco dust, and a mixture of red pepper and flour, with tobacco dust showing superior lasting qualities. All of these materials are liable to be washed off by rain. [From author's summary.]

2957. Tissot, A. N.
Control of moles.
Press Bull. Fla agric. Exp. Stat. **643**, 1948, pp. 4.
Deals with the habits of the mole, and control by means of repellents and traps.

Sprays and spraying.

(*See also* 3590.)

2958. STODDARD, E. M., AND DIMOND, A. E.
The chemotherapy of plant diseases.
Bot. Rev., 1949, **15**: 345-76, bibl. 106.

The subject is here limited to the treatment of virus, bacterial and fungus diseases by chemicals that exert their action inside the host plant. The authors review the work that has been done on the subject, and especially the progress made since 1930. Aspects of the problem that are discussed include the mode of action of the therapeutant, methods of introducing chemicals into plants, distribution of the chemicals within the plant, and the results that have been obtained and may be expected from this technique. X-disease of peach, common bacterial blight of beans, crown gall, and blue mould of tobacco seedlings are among the diseases that have been treated by chemotherapy. The authors conclude: "It is significant that the technique appears to lend itself particularly to types of diseases for which control practices are very unsatisfactory at the present time: the vascular parasites and virus diseases."

2959. PLANT PATHOLOGY LABORATORY, MINISTRY OF AGRICULTURE AND FISHERIES.
Specifications and methods of analysis for certain insecticides and fungicides.
Tech. Bull. Minist. Agric., Lond., No. **1**, 1949, pp. 63, 1s. 3d.

The substances dealt with in this bulletin are copper sulphate, dinitro-*ortho*-cresol-petroleum oil winter washes, formaldehyde, lead arsenate (powder and paste), lime-sulphur solution, metaldehyde, nicotine, nicotine sulphate, Paris green, petroleum oil washes, tar oil washes, tar-petroleum, and dimethyl sulphate. Notes are given on the preparation of freezing mixture at $-10°$ C. $\pm 1°$; preparation of freezing mixture at $-5°$ C. $\pm 1°$; ether; preparation and standardization of sulphuric acid reagent ($96{\cdot}6\% \pm 0{\cdot}1$ H_2SO_4), cetyl pyridinium bromide solution, and 0·5 N. iodide-iodate solution.

2960. DEPARTMENT OF COMMERCE AND AGRICULTURE, MELBOURNE.
Low volume spraying.
Bull. Farm Mechanisation Service, Department of Commerce and Agriculture, Melbourne, **18**, 1949, pp. 11, illus.

Data, diagrammatically illustrated, on nozzle performance, booms, strainers, pumps and overall design required for machines capable of applying insecticides and herbicides to agricultural crops at a rate of less than 10 gal. per acre.

2961. ANON.
Electrostatic dusts may come.
Fruitgrower, 1949, **108**, p. 182.

A report of an address given by Professor Pierre Hampe to the Paris Conference of the International Association of Horticultural Producers, of Zurich. The theoretical problems of dust electrification by irradiation and friction, and the practical advantages of electrostatic dusting (good coverage and adhesion, and prevention of waste) are discussed.

2962. KEARNS, H. G. H., AND MORGAN, N. G.
An underground return circuit spray mains system suitable for 15-25 acres of top fruit.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 130-8, bibl. 1.

An account with plans of a system installed in a 15-acre top fruit plantation at Milverton, Somerset, in 1946/47. The system has a return circuit to the pump house which aims at maintaining constant and high-flow pressures at the lances. The return circuit system ensures that materials are maintained in suspension by the velocity of the fluid, thereby materially reducing the build-up of deposits. The lay-out of the pump house aims at labour saving, rapid filling of tanks and efficient agitation. The piping in the pump house is arranged so that records of pump and pipe circuit performances can be readily determined. [From authors' summary.]

2963. MOORE, M. H.
Some thoughts on progress in fruit-spraying methods.
A.R. East Malling Res. Stat. for 1948, 1949, **A32**, pp. 153-6.

A popular review of the development of spray technique from its origins to the present day.

2964. BERAN, F.
Weitere Untersuchungen über die "Frostspritzung" von Obstbäumen. **(Further experiments on the spraying of fruit trees in frosty weather.)** [English summary ⅓ p.]
PflSch. Ber. Wien, 1949, **3**: 161-76.

A repetition of the trials [see *H.A.*, 19: 1104] confirmed the results obtained the previous winter, viz. that spraying in frosty weather considerably increases the effectiveness of tar oil and mineral oil emulsions against *Quadraspidiotus perniciosus*. Further experiments showed that the ovicidal action of sprays against *Doralis pomi*, *Cheimatobia brumata* and *Tetranychus pilosus* is also greatly enhanced by application at temperatures below freezing. In observations on a large scale the treatment was found to cause as little injury to the buds of apples, pears, plums and cherries of many varieties as do winter washes applied at higher temperatures.—Bundesanst. f. Pflanzenschutz, Vienna.

2965. MESSENGER, K.
Problems involved in airplane spraying.
Agric. Chemls, 1949, **4**: 9: 25-8, 76, illus.

Spraying from aircraft is coming into favour rapidly at the expense of dusting. Data are given on the behaviour of droplets after release from the aeroplane.

2966. WILSON, J. R. W.
Role of the helicopter in applying 2,4-D and pest control chemicals.
Agric. Chemls, 1949, **4**: 4: 22-6.

An illustrated survey of helicopter application in California with a discussion of *pros* and *cons*.

2967. KEARNS, H. G. H., AND MORGAN, N. G.
Spraying equipment for the fruit garden.
The Fruit Year Book 1949, R.H.S. Lond., pp. 100-8, illus.

Spraying in the fruit garden is discussed under spray coverage, spray pressure, spraying technique, the choice

of equipment, the syringe pump, the lance pump, the stirrup bucket pump and lance, pneumatic sprayer, the beam pump in a mobile tank, the lawn mower rotary pump and the motorized rotary pump.—Long Ashton Research Station.

2968. MONTGOMERY, H. B. S.
A minimum spray programme and suitable machinery for applying it.
The Fruit Year Book 1949, R.H.S. Lond., pp. 94-9.
A minimum programme for fruit spraying in the garden is described and tabulated, and an account is given of spray machinery and dusting machines.—East Malling Research Station.

Fungicides.

2969. MARSH, R. W.
New fungicidal sprays for apples.*
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 153-5.
Possible substitutes for lime-sulphur are discussed.

2970. HAMILTON, J. M.
Report of the section on fungicide tests for the control of apple diseases, 1948.
Plant Dis. Reptr, Suppl. **183,** 1949, pp. 115-34.
Wettable sulphurs as a group gave poor control of apple scab, particularly in comparison with the organics. Magnetic " 70 " was the most effective. The mixture of sulphur with a carbamate, Phygon, or phenyl mercury compound has definite possibilities. Fermate, in general, was decidedly more effective than the wettable sulphurs; this is the first year in which this has occurred. Bioquin 50W at 1-100 was not adequate for scab control in critical tests, but it was much improved by adding a sticker. The compound 341C gave remarkably good scab control in most critical tests but it was not effective in others. Phygon ½-100 was not strong enough to control scab except under favourable conditions. Scab control on Delicious and Stayman with a ground spray of Elgetol and a foliage spray of Puratized at petal-fall suggested possibilities for such a combined programme.

2971. LEWIS, F. H., AND KIRBY, R. S.
Sulfur injury to sour cherry petals.
Plant Dis. Reptr, 1949, **33**: 290.
In 1949 the authors found that the application of lime-sulphur just before blossoming was followed by severe injury to petals. In one instance, lime-sulphur in the pink spray killed about 80% of the petals, while adjacent unsprayed trees were not injured. It is felt that the effect of the sulphur was indirect and that the actual petal killing was due to low temperature.

2972. BOUGARD, M., AND AERTS, P.-F.
Usage des bouillies sulfocalciques en arboriculture fruitière. **(The application of lime-sulphur to fruit trees.)**
Fruit belge, 1949, **17**: 111-18.
The present status of lime-sulphur as a fungicide and acaricide in plant protection is discussed. Lime-sulphur is stated to cause less scorch than copper preparations and to stimulate growth. Leaf scorch caused by lime-sulphur is to a great extent controllable, as it depends on the methods of preparation and application. Lists are given of apple and pear varieties sensitive to sulphur and to copper. It is concluded that lime-sulphur is still of value in horticulture because of its low cost and many uses.

2973. MCNEW, G. L., AND SUNDHOLM, N. K.
The fungicidal activity of substituted pyrazoles and related compounds.
Phytopathology, 1949, **39**: 721-51, bibl. 32.
A remarkably effective group of new fungicides, the 4-nitrosopyrazoles, has been created. The more active members of the series prevent spore germination on glass slides at concentrations as low as 0·1 p.p.m.; provide 95% protection against *Alternaria solani* on tomato foliage at 10 to 60 p.p.m. in spray suspension; give commercial control of apple scab at 4 oz. per 100 gal. of spray mixture; and match, or excel, the performance of standard commercial fungicides in protecting seed of peas, maize, spinach, and beets from seed-decay and damping-off organisms in the soil.—U.S. Rubber Co., Bethany, Connecticut.

2974. RUI, D.
Trattamenti antiparassitari alle viti in fiore. **(Antiparasitic treatment of vines in flower.)**
Reprinted from *Ann. R. Staz. sper. Vitic. Enol. Conegliano 1944-45*, 1946, Vol. **12,** pp. 15 [received 1949].
Field trials with a number of copper-containing fungicides indicated that vines can be sprayed with them in full bloom without reducing the yield; laboratory experiments showed that they did not prevent germination of the pollen grains.

2975. EPPS, J. M., AND SHERBAKOFF, C. D.
Fungicides for the control of raspberry diseases.
Abstr. in *Phytopathology*, 1949, **39**: 495-6.
Of several fungicides tested for the control of raspberry diseases Fermate was most effective when used at the rate of 2 lb. in 100 gal. water. A delayed dormant spray of 1 to 10 lime-sulphur applied at the time the buds are breaking and three applications of the Fermate spray gave a substantial increase in yield over the other treatments.

2976. SHIPPY, W. B.
Flordo spray.
Press Bull. Fla agric. Exp. Stat. **636,** 1947, pp. 4.
Flordo spray, evolved at the Florida Agricultural Experiment Station, is a combination of copper sulphate and soap which has the fungicidal properties of the former and the wetting and insecticidal qualities of the latter. It is prepared from soap 10 lb., copper sulphate 2½ lb., strong ammonia 1 quart in 100 gal. water. Details for its preparation on a home basis (for 4 gal.) and a commercial basis are given.

2977. LEBEN, C., AND KEITT, G. W.
Laboratory and greenhouse studies of antimycin preparations as protectant fungicides.
Phytopathology, 1949, **39**: 529-40, bibl. 23.
Various crude antibiotic preparations derived from cultures of an unidentified species of *Streptomyces*

* Paper presented to the Commonwealth Mycological Conference of 1948.

were effective as protectant fungicides in controlling apple scab and tomato early blight in the greenhouse. A leaf disc assay for determining the amount of antibiotic on leaves is described.—University of Wisconsin, Madison, Wisconsin.

2978. DUNSHEE, B. R., AND OTHERS.
The isolation and properties of Antimycin A.
J. Amer. chem. Soc., 1949, **71**: 2436-7.
Antimycin A is a highly potent, fungicidal antibiotic isolated from cultures of a *Streptomyces* species. It was tested against *Colletotrichum* and *Stemphylium*.—Wisconsin Agricultural Research Station.

2979. VAUGHN, J. R., AND OTHERS.
The action of actidione on plant tissue and upon certain fungi.
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 456-64, bibl. 5.
The action of the antibiotic actidione, derived from *Streptomyces griseus*, on mildew of bean was discussed in an earlier paper [see *H.A.*, 19: 1223]. In the present investigation it is shown that actidione lends itself also to the control of mildew in greenhouse roses, though the required concentrations of 2½ p.p.m. causes some injury to the new foliage. Because of its possible use as a soil insecticide the effect of the antibiotic on seed germination was studied in a number of vegetables. Inhibition occurred in some varieties, while others were not affected, even at high concentrations. Tests of actidione against pathogenic fungi in culture are also reported.

Insecticides.

2980. BREMOND, E., AND ROUBERT, J.
Les nouveaux insecticides viticoles et le vin.
(The new insecticides used in viticulture and their effect on wine.)
Ann. Inst. agric. Algér., 1949, **4**: 7: 58, bibl. 14.
A study of 4 new insecticides used against vine microlepidoptera, in relation to their effect on wine. They are 3 organic insecticides, viz. Lethane, hexachlorocyclo-hexane, and DDT, and a mineral one, Biquinze (fluosilicate + fluoaluminate).

2981. BENNETT, S. H., AND OTHERS.
The qualitative examination of insecticidal properties. Progress report, 1948.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 138-52, bibl. 4.
The insecticides are discussed under the following headings:—polychloroethane derivatives, hexachlorocyclohexane, miscellaneous chlorinated derivatives, rotenone, organophosphorus compounds (both as stomach poisons and contact materials), chlorinated hydrocarbons and aliphatic thiocyanates. Systemic insecticidal action is also discussed.

2982. METCALF, R. L.
The mode of action of organic insecticides.
Pap. Univ. Calif. Citrus Exp. Stat. **587,** 1948, 84 pp, being *Rev. 1 N.R.C., Chemical Biological Coordination Center*, Wash., D.C.
A review of the mode of action of nicotine, pyrethrum, rotenone, organic thiocyanates, dinitrophenols, phenothiazine, dichlorodiphenyltrichloroethane, benzene hexachloride, and organic phosphates.

2983. DAVIES, R. G., AND EATON, J. K.
The effect of hydrogen-ion concentration on the ovicidal activity of some nitrophenol emulsions.
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** pp. 111-17, bibl. 24.
The toxicity of emulsions of 2: 4-dinitro-6-methylphenol, its acetate and 2: 4-dinitro-6-*cyclo*-hexylphenol in 3·0% petroleum oil to over-wintering eggs of *Aphis pomi* Deg. was shown by a laboratory technique to be unchanged, within the limits of sampling error, between pH 4 and pH 8, but to fall at pH 10. Although strongly alkaline emulsions are less toxic than acid or slightly alkaline ones, the effect is unlikely to be of practical importance within the range of values given by most natural waters.

2984. BABERS, F. H.
Development of insect resistance to insecticides.
Publ. U.S. Dep. Agric., agric. Res. Administ. Bur. Ent. Pl. Quar. **E-776,** pp. 31, bibl. 111.
Several insects have developed resistance in the field to certain insecticides that formerly gave good kills. Similar resistance has been developed in laboratory strains through breeding successive generations of insects that are exposed to toxic but not 100% lethal doses of insecticides. Many factors are involved and no single type of resistance is apparent. The differential resistance of strains of the California red scale (*Aonidiella aurantii*) and the codling moth, at least, are inherited through Mendelian laws, with genes playing their usually accepted role.

2985. ROHWER, S. A.
Initial flavor and odor studies with benzene hexachloride.
Agric. Chemls, 1949, **4**: 8: 35, 75-6.
The article is a summary of results obtained in preliminary, co-operative trials with certain vegetable crops and with peaches. The tests indicated "that benzene hexachloride formulations should contain the minimum practical quantity of the delta isomer when they are to be used in situations where plant safety may be involved and the minimum practical quantity of both the beta and delta isomers when the flavour or odour of the edible portion of plants may be affected. They also indicated that it would be helpful to eliminate the major portion of the alpha isomer."

2986. KELSHEIMER, E. G.
Parathion (3422): a new and potent insecticide.
Press Bull. Fla agric. Exp. Stat. **641,** 1948, 2⅛ pp.
Parathion has been used successfully for insect control in Florida in the form of sprays and dusts. For spraying, 1 lb. of the concentrate (25% wettable powder) in 100 gal. water is suggested; for dusting, 0·5 and 1·0% dusts have been used, i.e. 2 to 4 lb. of the concentrate per 100 lb. dust. Good control has been obtained of the green peach aphid (*Myzus persicae*), the cabbage aphid (*Brevicoryne brassicae*), an aphid (species not determined) on pepper, the Southern armyworm (*Prodenia eridania*) and certain other insects.

2987. Frohberger, P. E.
Untersuchungen über das Verhalten des Insektizids Diäthyl-p-nitrophenyl-thiophosphat (E 605) auf und in der Pflanze. (**The action of the insecticide diethyl-p-nitrophenyl-thiophosphate (E 605) on and in the plant.**) [English summary 1½ pp.]
Höfchen Briefe, 1949, **2**: 2, pp. 10-91, bibl. 29.

These are some of the results of trials carried out at Leverkusen on ornamental plants, vegetables and fruits: (1) Spraying at the usual concentration of about 0·02% did not cause any injury. At concentrations above 0·1% susceptible plants showed symptoms of damage, though this was temporary and localized. (2) The insecticide has neither a manurial nor a stimulating effect. (3) Most of the chemical applied to fruits dissolved within 24 hours in the lipoids covering the skin. It did not penetrate into the pulp. (4) The short-distance spread of the chemical in the plant tissue must be considered as a process of diffusion, whereas the long-distance effect is accounted for by the transport of the insecticide in the sap stream. (5) Small quantities of the chemical were found to be present in the guttation liquid, but transpiration gases and root excretions proved to be non-toxic. (6) In living leaf tissue the insecticide is quickly inactivated by ferments, probably of the cytoplasm.

2988. Sörgel, P.
Bericht über Vergleichsprüfungen mit einem hexa-Präparat und E 605 bei "Italiener Zwetsche". (**Comparative trials with benzene hexachloride and E 605 against plum pests.**)
[*Publ.*] *Bayr. Gärtnereiverb.*, 1949, pp. 4.

E 605 proved effective against the following plum pests: sawfly, red spider, aphids and woolly aphid. Moreover, spraying against sawfly reduced populations of the red plum maggot.

2989. Walker, K. C.
Problems relating to the removal of DDT spray residue from apples.
J. agric. Res., 1949, **78**: 383-7, bibl. 4.

Reports the results relating to the effect of washing, of certain stickers and spreaders, and of overhead sprinkling on removal of DDT residue.—Washington Agricultural Experiment Station.

2990. Spoon, W.
De toekomst van het insecticide derris. (**The future of derris as an insecticide.**)
Meded. Dir. Tuinb., 1949, **12**: 400-1, bibl. 4.

The author raises the question whether derris, an insecticide harmless to man and domestic animals, has been definitely displaced by the new synthetic insecticides DDT, HCH, HETP (or TEPP), Parathion, etc., which are all more or less toxic to man. Mention is made of its use in certain cases because of its harmless character towards man.

2991. Anon.
TEPP (Tetra ethyl pyrophosphate).
Lincoln. agric. J., 1949, **1**: 149-56.

A practical account of its use, particularly in horticulture, for the control of aphids, mites and other pests.

2992. Raucourt, M., and Ventura, E.
Influence de la température sur l'efficacité des insecticides de contact. (**The effect of temperature on the efficacy of contact insecticides.**)
Parasitica, 1949, **5**: 33-8, bibl. 5.

It is generally admitted that the insecticidal action of chemical compounds diminishes when the surrounding temperature falls below a certain value. Trials against the Colorado beetle during the summer of 1948 showed that this diminution in activity is much more pronounced for contact insecticides than for "stomach poisons" such as arsenates.—Laboratoire de Phytopharmacie, Versailles.

2993. Todd, F. E., and others.
The effect of field applications of insecticides on honey bees.
Agric. Chemls, 1949, **4**: 8: 27-9, 77, bibl. 10.

In a comparison of insecticides tested on an alfalfa field toxaphene was found to be much less toxic to bees than parathion, DDT or chlordan.

2994. Bottger, G. T., and Gertler, S. I.
Preliminary tests on N-substituted phthalimides as insecticides.
Publ. U.S. Dep. Agric., agric. Res. Administ. Bur. Ent. Pl. Quar. **E-777**, 1949, pp. 7.

Twenty-five N-substituted phthalimides have been tested in the laboratory of the Bureau at Sanford, Fla, or at Anaheim, Calif. A number of horticultural pests were used as test insects. The results are tabulated.

Insecticidal plants.

(*See also* 3568.)

2995. Hageman, R. H., and Pagán, C.
An agronomic evaluation of nine Mayaguez-Goodyear (MG) clones of *Derris elliptica*.
Agron. J., 1949, **41**: 440-2, bibl. 8, illus.

In 1946 nine MG clones of *Derris elliptica* var. Changi III were evaluated, and numbered in order of decreasing rotenone percentage [see *H.A.*, 16: 2201]. The present paper reports a second trial with an increased number of replicates, which it was believed would give a more valid order of rank. In addition the clones were evaluated biologically by the guppy test. The authors observed "a significant correlation between the percentages of rotenone and rotenone plus rotenoids with biological toxicity (rotenone equivalent). The correlation between total chloroform extractives and rotenone equivalent was highly significant. The average yield of rotenone for the nine clones was about one-half the yield of toxicity, as determined by bio-assay."—Federal Experiment Station, Mayagüez, Puerto Rico.

2996. Pagán, C., and Hageman, R. H.
Effect of root diameter on chemical and biotoxic constituents of derris.
J. agric. Res., 1949, **78**: 417-23, bibl. 14.

It is shown that in the MG clones of the Changi variety roots of derris 2 to 4 mm. in diameter were the best in quality, while roots 4 to 10 mm. in diameter gave the best yield and contained most toxic constituents. All the root produced by this variety was marketable. In the Sarawak Creeping variety the group 4 to 10 mm.

in diameter was the best in quality and contained the greatest amount of toxic constituents. Roots less than 2 mm. or above 10 mm. in diameter do not have the minimum rotenone content for marketable roots; rejecting the thick roots (10 mm. and over) would bring the remaining roots to marketable standard.—U.S. Dep. Agric., Mayagüez, P.R.

2997. MENDES, J. V.
El cultivo del cube (Barbasco) en el Oriente Peruano. **(The cultivation of *Lonchocarpus* in Eastern Peru.)**
Ext. Circ. Estac. exp. agric. Tingo Maria **25,** 1949, pp. 9.

The Lonchocarpus industry in Peru was greatly stimulated by war conditions, but is now threatened by the fall in prices. The Estación Experimental Agrícola at Tingo Maria here publishes an account of the methods of cultivation that have been found most economic and successful by growers and experimentally. Recent investigations have proved the advantage of planting cuttings at an angle of 45°, close spacing of 1 m. between the plants, and sun-drying of the roots.

2998. JAKOBS, H.
De zaden van *Pachyrrhizus erosus*, een nieuw insecticide. **(The seeds of *Pachyrrhizus erosus*, a new insecticidal plant.)**
Chron. Nat., 1949, **105**: 122-3.

The plant is commonly grown as a root vegetable in central Java, and the seeds contain a substance highly toxic to fish and probably insecticidal. Their high oil content, however, has made their use as an insecticide difficult. A suitable method of preparation is suggested, involving the extraction of the oil, which could be used as a by-product. The composition of seeds and oil is given.—Chemical Research Laboratory, Buitenzorg.

Noted.

2999.

a AMERICAN CYANAMID COMPANY.
Thiophos parathion.
Tech. Bull. Amer. Cyanamid Co. **2,** 1948, pp. 25.

b ANON.
Japanese beetle.
Picture Sheet U.S. Dep. Agric. Bur. Ent. Pl. Quar. No. **4** [? 1949].
Gives control measures.

c BRADFORD, F. C.
Inheritance of susceptibility to cedar-apple rust in seedlings of crab apples. [Trials at Glenn Dale, Md.]
Proc. Amer. Soc. hort. Sci., 1949, **53**: 213-15, bibl. 15.

d GERSDORF, —.
Überwinterung der Pfirsichblattlaus (*Myzodes persicae*) im Winter 1948/49. **(Hibernation of the green peach aphid in the winter of 1948/49.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 82.

e HARRIS, R. V., AND CADMAN, C. H.
Can the health of raspberry stocks be improved ?
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** pp. 138-40.
Reprint of article already noted [*H.A.*, 19: 1921.]

f MASSEE, A. M.
Spraying in the fruit garden.
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** pp. 148-51, illus.
Reprinted from *J. roy. hort. Soc.* [noted *H.A.*, 19: 319h].

g MONACHINO, J.
A revision of *Ryania* (Flacourtiaceae).
Lloydia, 1949, **12**: 1-29, bibl. 63.
Notable for its toxic properties.

h PEREIRA, H. F., AND GONÇALVES, L. I.
Caramujos, caracóis e lesmas nocivos e meios de combate. **(Harmful water snails, land snails and slugs, and methods of control.)**
Biológico, 1949, **15**: 65-73, bibl. 10, illus.

i ROGERS, W. S.
Frost damage to fruit: a note on the present position of research in England.
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** pp. 128-30, bibl. 4, illus.
[See *H.A.*, 19: 1904.]

j SHAULIS, N. J., AND ALDERFER, R. B.
Soil structure relations to runoff and erosion in a peach orchard.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 40-8, bibl. 8.

k SIEGLER, E. H., AND GERTLER, S. I.
Laboratory tests of some aliphatic N-substituted *p-nitrobenzamides* against the codling moth.
J. econ. Ent., 1949, **42**: 151-2, bibl. 1.

l SINGH, R. N.
The biology and control of *Pseudaulacaspis pentagona* (Targioni) pest of peach trees in the Kumaun Hills [India].
Indian J. agric. Sci., 1946, **16**: 470-7, bibl. 5, illus. [received 1949].

m STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Specialpraeparater til sommersprøjtning mod skurv på aeble. **(Fungicides for summer spraying against apple scab.)**
Erhvervsfrugtavl., 1949, **15**: 276-7, being *Medd. Statens. Forsøgsvirks. Plantekult.* **443.**

n STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sygdomme og skadedyr på ribs. **(Diseases and pests of currants [and control measures].)**
Erhvervsfrugtavl., 1949, **15**: 273-5.

o SUMMERS, F. M.
Resistance to basic lead arsenate by the peach twig borer within a small area in Central California.
J. econ. Ent., 1949, **42**: 22-4, bibl. 13.

p THIEM, H.
Betrachtungen zur Lage und Bekämpfung der San José Schildlaus im südwestdeutschen Befallsgebiet. (Incidence and control of the San José scale in south-western Germany.)
Reprinted from *Z. Pflkrankh.*, 1948, **55**: 17-29, bibl. 17.

q WAY, M. J.
Laboratory experiments on the effect of DDT and BHC on certain aphidophagous insects and their hosts.
Bull. ent. Res., 1949, **40**: 279-97, bibl. 33.

r WILSON, E. E., AND MILLER, H. N.
Olive leaf spot [*Cycloconium oleaginum*] and its control with fungicides.
Hilgardia, 1949, **19**: 1-24, bibl. 31, illus.

WEEDS AND WEED CONTROL.

Particular weeds.

(*See also* 3250, 3576.)

3000. DUNHAM, R. S., LARSON, A. H., AND ROBINSON, R. G.
Weed seedlings.
Bull. Minn. agric. Exp. Stat. **397**, 1947, pp. 36, bibl. in text, illus. [received 1949].
Simple, brief, illustrated descriptions are given of 28 weed species in their cotyledon and first true leaf stages. All are dicotyledonous annuals and biennials infesting Minnesota crops. [Most of them also occur in Britain.] Nine other species are briefly described, but are not illustrated. The descriptions are intended to help those who must make early identifications of young weed seedlings in field or laboratory. The decision whether or not to use a selective herbicide may rest on early recognition.

3001. MUENSCHER, W. C.
Some selected introduced noxious weeds that should receive special attention for control.
Proc. N.E. States Weed Control Conf. 1948, pp. 155-62.
The speaker deals with nut grasses (*Cyperus* spp.), Cypress Spurge (*Euphorbia cyparissias*), ragweed (*Artemisia* spp.), waternut (*Trapa natans*) and Austrian field cress (*Roripa austriaca*).

3002. SOLONEN, M.
Muutamia havaintoja juolavehnän juurakoista ja juurista. **(Observations on the rhizomes and roots of couch grass.)** [English summary ½ p.]
Maataloust. Aikakausk., 1949, **21**: 83-8, bibl. 8.
The rhizomes of couch grass (*Agropyron repens*) are confined to a very thin surface layer, the maximum depth being usually 10 cm. In general couch grass is considered a very shallow-rooted plant, but the author's observations show that its root system is profuse and penetrates to a maximum depth of 60-90 cm. [From author's English summary.]

3003. JACKMAN, G. R., AND TINCKER, M. A. H.
The use of a selective weed killer in nursery gardens, the control of horsetail (*Equisetum arvense*.
J. roy. hort. Soc., 1949, **74**: 351-5, bibl. 3.
A report of trials in which 2-methyl,4-chlorophenoxyacetic acid, in powdered form (as Agroxone) and in solution (as Methoxone), was used for the control of common horsetail in the nursery. Both forms gave effective control, but Agroxone proved more convenient. One application at the rate of 6 oz. standard preparation per sq. yd. given in May was sufficient to kill all the green shoots for the season, but for complete eradication repeated application over 3 seasons was needed to exhaust the underground tissues. Practical points concerning application are noted. Resistant weeds and the species of shrubs that germinated satisfactorily in treated seedbeds are listed. *Cotoneaster* seedlings, among others, were seriously damaged.

3004. GARDNER, H. W.
Hoary pepperwort in Hertfordshire.
Agriculture, 1949, **56**: 272-5, bibl. 1, illus.
This plant, a serious weed pest in parts of S.E. England, may become a menace on all kinds of soil. It is suggested that by adopting a policy of a sequence of spring crops with annual hormone treatments the weed could be practically eliminated on infested land in 3 or 4 years. Promising results have been obtained by applying MCPA spray at the rate of 4 gal. (=4 lb. of the hormone) per acre and from MCPA powder (2 cwt. commercial powder per acre=2 lb. MCPA). Further experimental results are promised in a forthcoming article.

3005. WHITE, C. T.
Star thistle (*Centaurea calcitrapa*)—a new weed pest [in Queensland].
Qd agric. J., 1949, **69**: 84-5, illus.
A brief description of this biennial or perennial weed, native of south and west Europe, which appeared in S.E. Queensland in 1948. Control measures suggested are hand pulling and hormone spraying.

3006. BROWN, R., AND OTHERS.
The stimulant involved in the germination of *Striga hermonthica*.
Proc. roy. Soc., 1949, Ser. B, **136**: 1-12, bibl. 11.
The seeds of *Striga hermonthica* will only germinate readily when they have been exposed to a chemical stimulant released from a potential host root. The purpose of this investigation has been the examination of the chemical nature of the stimulant.

3007. WURGLER, W.
Une nouvelle mauvaise herbe: l'Armoise des frères Verlot. **(A new weed: *Artemisia verlotorum*).**
Rev. romande Agric. Vitic., 1949, **5**: 60-1.
For some years the wormwood species *A. verlotorum* has been invading southern Switzerland, where it has established itself as a dangerous weed. In crops not susceptible to 2,4-D it can be controlled by 2-3 applications of the herbicide, at 10-day intervals, followed by removal.—Lausanne.

Herbicides and their action.

(*See also* 2672, 2701, 2966, 3533, 3589.)

3008. MINSHALL, W. H., AND HELSON, V. A.
Some effects of herbicidal oils on the physiology of plants.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 193-7.
In an attempt to study the mechanism of the selective action of herbicidal oils, the effect of a petroleum naphtha on the physiology of umbelliferous crop plants and their weeds was investigated. Application of petroleum naphtha to leaves immediately disrupted photosynthesis in all plants tested. This disruption was permanent in mustard, a susceptible weed, but only temporary in parsnip. Transpiration also ceased permanently in mustard, but was only temporarily reduced in parsnip. This suggests that an interference with the water supply may be responsible for the disruption of photosynthesis, and its extent may determine the degree of susceptibility of the plant to oil sprays.—Dominion Dep. Agric., Ottawa.

3009. MINSHALL, W. H., AND HELSON, V. A.
Some effects of herbicidal oils on the physiology of plants.
Proc. N.E. States Weed Control Conf. 1949, pp. 8-13, bibl. 14.
A brief review of the literature and work at the Dominion Department of Agriculture, Ottawa, concerning the penetration of herbicidal oils, their distribution within the plant, the effect of oils on the physiology of the plant, and the mechanism of selective action of herbicidal oils.

3010. RAYNOR, R. N.
New developments with herbicides.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 20-4.
The application and range of 4 new chemical herbicides are discussed. The range of isopropylphenyl-carbamate (IPC) is limited to the control of susceptible grasses, mainly winter annuals, in tolerant broad-leaved crops and on fallow land. Trichloroacetate shows promise against perennial grasses, including Bermuda, Johnson, quack and blue grasses, and applied to the soil it will inhibit germination of annual and perennial grass seeds. Potassium cyanate is recommended as a selective weedkiller in onion and garlic crops. The organic mercurials are very valuable for control of crab-grass in lawns.

3011. EVANS, L. S.
Recent developments in herbicides.
Proc. 10th annu. Western Weed Control Conf. Calif., 1948, pp. 10-14.
The development and value of many of the new herbicides for grass killing, pre-emergence treatment, control of aquatic weeds and other specific purposes are dealt with.—Div. Cereal Crops and Diseases, U.S.D.A.

3012. ROBBINS, W. W.
History and development of weed control.
Proc. 10th annu. Western Weed Control Conf. Calif., 1948, pp. 5-9.
The author concludes that the greatest progress has been made in chemical methods of control; in this field the discovery and use of selective herbicides rank first. Rapid advancement has been made in spraying machinery, the development of equipment and materials which permit low-volume applications being of particular significance. There is a tendency to give too much attention to chemical methods of control and to neglect cultural methods, or combinations of the two. Progress in control of any one specific weed requires extensive fundamental research, which should be encouraged. The cultural aspect of the weed control programme has been neglected.

3013. CROCIONI, A.
Ricerche sugli erbicidi selettivi ad azione ormonica. **(Research on selective hormone herbicides.)** [English summary 18 ll.]
Ann. Sper. agrar., 1949, **3**: 691-708, bibl. 34.
In trials at Bologna and Corticella in northern Italy the use of the sodium salt of 2,4-D was entirely successful against *Vicia sativa*, *Salvia pratensis* and *Ranunculus arvensis*. Grasses, however, showed complete resistance at ordinary concentrations. A few tests were made with 5-chloro-1-methyl-2-oxyacetic acid and with 1-methylchloro-2-oxybenzolacetic acid. The former proved very active, the latter gave poor results.—Ist. Agron. Gen., Bologna.

3014. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forskellige kemikaliers virkning på ukrudtsplanter. **(The effect of some chemicals on weed plants.)**
Kemiske ukrudtsmidlers virkning på kulturplanter. **(The effect of chemical weed killers on cultivated plants.)**
Erhvervsfrugtavl., 1949, **15**: 302-4 and 305-7.
Experimental data are tabulated for hormone and other herbicides.

3015. ÅBERG, E.
Effect of hormone derivatives on weeds and cultivated plants.
Ann. roy. agric. Coll. Sweden, 1949, **16**: 695-710, bibl. 44.
A detailed summary in English of the paper noted *H.A.*, 19: 2089a, discussing the results of Swedish experiments 1946-48.

3016. HOLMES, G. R.
Accessories for weed spraying equipment.
Proc. 1st annu. Calif. Weed Conf. 1949, pp. 80-2.
The component parts necessary for a specific weed spraying machine, and the available types of tanks, pumps, etc., are considered.

3017. WASHBURN, B.
Developments and techniques in commercial weed spraying.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 78-80.
Some practical suggestions, based on commercial experience, concerning the construction and equipment of ground spraying machines for weed control.

3018. Akesson, N. B.
Research and development in chemical weed control equipment.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 72-4.
Some factors affecting droplet size and drift of sprays, and certain devices designed to check nozzle pattern, are discussed.

3019. Baumgartner, L. L., and Wolf, B.
Sodium isopropylxanthate as a new selective herbicide.
Contr. Boyce Thompson Inst., 1949, **15**: 403-9, illus.
Data on the use of sodium isopropylxanthate as a new selective weed killer are presented. It controlled annual weeds such as purslane, pigweed, bedstraw, lamb's quarters, henbit, and ragweed, in lima beans, peas, and cabbage. Application of this herbicide at rates of 10 to 12 lb. per acre selectively killed annual weeds in peas and beans, without causing injury to the crops. Rates above 15 lb. per acre caused injury to peas. Cabbage was not seriously injured when sprayed at the rate of 17 lb. per acre. This herbicide, possessing high water solubility, can be applied as a dust or liquid spray. [Authors' summary.]

3020. Mitchell, J. W.
2,4-D, its physiological effect on plants and factors effecting its inactivation in soil.
Proc. N.E. States Weed Control Conf. 1948, pp. 32-41.
An account of the absorption and translocation of 2,4-D by plants, and its effect on their physiological processes. The effect of temperature, moisture, soil organisms and organic matter on the rate of inactivation of 2,4-D in the soil is also discussed.

3021. Leone, I. A., and Brennan, E.
Response of several economically important plants to sodium salt of 2,4-D.
Agric. Chemls, 1949, **4**: 40-3, 82-5, bibl. 20.
The experimental plants, including tomato, bean, maize, nasturtium, poinsettia and geranium, were grown in solution or sand culture. Two methods of application of the Na salt of 2,4-D (0-4 p.p.m.) were used, some of each species being treated through the roots and some through the aerial portions. After the desired period of exposure plants were transferred to nutrient solutions free of the hormone and subsequent growth was compared with that of untreated plants. The response to the treatment is recorded in some detail, partly with the aid of photographs. Painting the aerial portions did not produce any effect on the roots more serious than a slight reduction in size, though there was evidence of a downward movement of the stimulus from the leaf, for instance in tomato where root primordia appeared on the lower stem portion. If the roots were treated, the stimulus was found to travel rapidly upward, the first symptoms usually becoming visible in the young growing points. The response of the roots themselves was a peculiar hypertrophy or fasciation of the lateral roots as well as a curvature and distortion. The experiments indicate the possibility of injury to economic plants resulting from a contamination of the soil by traces of 2,4-D.—Rutgers University, New Brunswick, N.J.

3022. Mitchell, J. W., and Linder, P. J.
Physiological research on weed control at the U.S. Plant Industry Station.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 188-92.
Work on the absorption and translocation of 2,4-D in the plant is reported, among other subjects.

3023. Staniforth, D. W., and Loomis, W. E.
Surface action in 2,4-D sprays.
Science, 1949, **109**: 628-9, bibl. 4, illus., being *Paper No.* **J1654,** *Ia agric. Exp. Stat.*
A number of workers have reported increased toxicity when various substances are added to sprays of 2,4-dichlorophenoxyacetic acid used as a herbicide. Commercial soapless powders with a base of sodium lauryl sulphate have been used most extensively as surface-acting compounds. Figures are given showing some results from spraying different crops with 2,4-D plus various wetting agents. The toxicity of the sodium and amine salts of 2,4-D to corn, flax, and soybeans has been increased five or more times by adding about 1% of commercial non-soap wetting agents. Since several divergent types of agents have given the effect, it is probably not chemical in nature. Decreased surface tension and increased penetration of the sprays seem to be the probable answer, but it is not a simple relationship. The effect on weeds is similar to the effect on crops. Resistant weeds show more injury but are not more readily killed. The main effect of the wetting agents is to reduce the selective action of 2,4-D by which it is possible to kill susceptible weeds with little injury to resistant crops.

Weed control on irrigated lands.

3024. Balcom, R. B.
The Bureau of Reclamation's part in the control of weeds on irrigation projects.
Proc. 10th annu. Western Weed Control Conf. Calif., 1948, pp. 14-16.
Weeds on irrigation projects seriously deplete land and water resources, and make the operation and maintenance of irrigation canals and farm systems a problem. Data are given on the losses due to weeds, and methods and costs of weed control in channels and on ditch banks. The U.S. Bureau of Reclamation is investigating more economic and effective methods of control, which are briefly mentioned.

3025. Hodgson, J. M.
Weed control investigation of irrigated lands of Idaho.
Proc. 10th annu. Western Weed Control Conf. Calif., 1948, p. 27.
A brief report of the work of the Weed Experimen. Station established on irrigated land in Idaho in 1946 Trials with a new electric weed-killing machine, the Electrovator, proved it uneconomical as a practical means of weed control in this area. In preliminary tests of contact herbicides for cleaning ditch banks, Shell 20 and Atlacide gave good results, but Diesel oil and Dow General were unsatisfactory. The proprietary substance Benoclor gave good control of the submerged weed *Potamogeton pectinatus* in irrigation canals, but the treatment is expensive. Copper sulphate gave poor control. Promising results were

given by a solvent coal tar naphtha in the control of some aquatic weeds.

Weed control in the tropics.

3026. ESPINO, R. B.
Effects of 2,4-D on some common [tropical] plants.
Philipp. Agric., 1948, **32**: 60-4, being *Exp. Stat. Contr.* **1497** [received 1949].

Among the seven garden or farm weeds sprayed with 2,4-D solution at the rate of 2·3 g. 2,4-D powder per litre, no apparent toxic effect was observed on *Cyperus rotundus*, *Imperata cylindrica*, and *Paspalum conjugatum*. *Elephantopus scaber* and *Mimosa invisa* recovered after wilting. *Synedrella nodiflora* was killed outright. One group of *Amaranthus spinosus* was killed, but another group was not. Among the ornamental and food-producing species, no toxic effect was observed on *Canna indica*. *Momordica charantia* recovered from the wilting. The solution was harmful to *Manihot utilissima* and fatal to *Phaseolus lunatus*. It is concluded that 2,4-D in the concentration tested cannot kill the five most common and most troublesome garden and farm weeds in the Philippines.

3027. HARTLEY, C. W. S.
An experiment on mechanical methods of lalang eradication.
Malay. agric. J., 1949, **32**: 236-52, illus.

An experiment is described in which heavy sheet lalang [*Imperata arundinacea*] on inland quartzite soil in an exposed situation was successfully eradicated by disc and mould-board ploughs, heavy disc-harrows, and a rotary cultivator. Though no significant differences were shown between these four treatments there is an indication that ploughing is more consistently effective than disc-harrowing or rotary cultivation. A final cultivation with a straight-tine cultivator significantly reduced the amount of lalang which survived. Lalang which survived the treatments was dug out at a cost varying from only $2.27 per acre (disc-ploughing and tine cultivation) to $13.65 per acre (rotary cultivation without tine cultivation). Costs of mechanical cultivation varied from about $35 to $56 per acre but it was shown that with suitable tractors and implements eradication could be carried out for costs as low as $20 to $25 per acre (including depreciation, etc.). The application of these results to other soils and other situations is discussed. In a small trial in which eradication of lalang was attempted with varying numbers of weekly sprayings with sodium arsenite and varying numbers of cultivations with a rotary cultivator, it was shown that spraying before cultivation was more effective than the reverse. Effective control was obtained with 2 sprayings followed by 4 rotary cultivations. [From author's summary.]

3028. KEEPING, G. S., AND MATHESON, H. D.
Mechanical spraying for the eradication of lalang [*Imperata arundinacea*].
Malay. agric. J., 1949, **32**: 253-9, bibl. 2, illus.

A description is given of trials with various types of mechanical sprayers at the Federal Experiment Station, Serdang, Malaya. It is shown that costs of spraying sodium arsenite solution for the eradication of lalang can be reduced by the use of mechanical sprayers. Both light sprayers attached to horticultural tractors and lance and boom sprayers attached to a light crawler-tractor were used, and in the latter case total spraying costs were reduced to the equivalent of $53 per acre for a full 10 sprayings. [From authors' summary.]

Weed control in fruit crops.

3029. VIEHMEYER, G.
2,4-D for weed control in orchards, shelter belts and ornamental plantings.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 65-7.

Recommendations are made on the use of 2,4-D as a herbicide in plantations of deciduous and evergreen woody plants. The formulation used is of great importance: the esters should be avoided because of their volatility, but the salts can be used with safety provided care is taken to prevent the spray coming into direct contact with the foliage. Precautionary measures include the use of low pressures and coarse sprays, and shields to protect low-headed plants from drift. 2,4-D should only be used in places inaccessible to cultivating equipment. The susceptibility of various species (but not varieties) of small and tree fruits are noted. The importance of further investigations, including a study of the possible cumulative effect of repeated treatments, is stressed.—University of Nebraska.

3030. ANON.
Grass killers tested.
Amer. Nurserym., 1949, **91**: 5: 58-61.

Greenhouse tests are reported from Michigan State College, East Lansing, on the use of the sodium and ammonium salts of trichloroacetate (TCA), ammonium thiocyanate (ATC) and the herbicide PB for control of quack grass and Kentucky bluegrass in small fruit plantations. Both formulations of TCA gave a good, gradual kill of the grasses; 150-200 lb. per acre were required for complete kill of established grass. ATC was more effective on young than established grasses. Four weeks after spraying with PB, no effect was observed on quack grass, but broad-leaved weeds were dead; this suggests that PB may have value as a selective herbicide. The growth of raspberry plants, given dormant and foliar sprays of the ammonium salt of TCA at 1,500 and 1,000 p.p.m. respectively, was affected slightly, but not seriously retarded. Strawberry plants, however, were killed by concentrations of even 500 p.p.m.

3031. CROSS, C. E.
Chemical weed control in Massachusetts cranberry bogs.
Proc. N.E. States Weed Control Conf. 1948, pp. 126-31.

An account of the effect and methods of application of weed-killers commonly used on cranberry bogs. They include ferrous sulphate, paradichlorobenzene, sodium chloride, copper sulphate and kerosene. 2,4-D is not used, as the cranberry vine is very susceptible to 2,4-D injury.—Cranberry Exp. Stat., East Wareham, Mass.

3032. CARLSON, R. F.
Weed control in small fruits.
Agric. Chemls, 1949, **4**: 8: 37-9, 71, bibl. 7.
Basing his views on published literature and on information from reliable growers, the author comes to the conclusion that 2,4-D (¼-½ lb. acid equivalent per acre) can be recommended for use on a first-year strawberry bed. Applications should be made with low-volume nozzles at the rate of about 5 gal. per acre. IPC applied at the rate of 10 or 15 lb. per acre was found to control chickweed (*Stellaria media*), without injuring the strawberry plants. In raspberry, where grasses gave trouble, TCA was shown to combine control with safety if applied in the autumn, while applications made in spring caused chlorosis, though weed destruction was more complete.

3033. CARLSON, R. F., AND MOULTON, J. E.
Control of grasses in raspberries by fall, spring and summer applications of sodium trichloroacetate.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 241-6.
Preliminary report from East Lansing, Michigan, of the control of quack (or couch) grass (*Agropyron repens*) and Kentucky blue grass (or Timothy).

3034. CARLSON, R. F.
Some aspects of weed control in small fruits. (Preliminary report.)
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 68-72, bibl. 7.
On the result of field trials, here briefly reported, 2,4-D (at ¼-½ lb. acid equivalent per acre) is provisionally recommended for weed control on first-year strawberry beds. The advisability of 2 applications during the season depends on the weed problem and the tolerance of the variety grown. Varieties are listed in decreasing degree of tolerance as follows: Robinson, Sparkle, Temple, Premier, Massey and Gandy. 2,4-D did not control chickweed but promising results were given by IPC (isopropylphenylcarbamate). Quack grass and Kentucky blue grass in raspberry plantations were controlled satisfactorily without injury to the canes by autumn applications of TCA (sodium trichloroacetate). —Michigan State College.

3035. GILBERT, F.
Control of weeds in strawberries with 2,4-D.
Proc. N.E. States Weed Control Conf. 1948, pp. 123-5, bibl. 2.
Preliminary trials made at the New Jersey Experiment Station with the Sparkle and Pathfinder varieties of strawberry indicate that a preplanting spray of 2,4-D may be used to retard the growth of grasses and broad-leaved weeds without injury to the plants. Sprays applied during the first year after planting gave promising results for control of broad-leaved weeds.

3036. GILBERT, F. A.
Progress report on weed control in strawberries.
Proc. N.E. States Weed Control Conf. 1949, pp. 49-51.
Limited trials at Rutgers University indicate that practical control of susceptible weeds can be obtained in strawberry fields during the spring of the fruiting year by sprays of 2,4-D (1 lb. acid per acre) applied as growth is starting. In a newly planted field, growth of weeds and grass was controlled by a 2,4-D application made 5 days after cultivation, thus killing the germinating seeds. The strawberry varieties Blakemore and Redwing were used in these tests.

Weed control in vegetables.

3037. ALBAN, E. K.
Chemical weed control in horticultural crops.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 58-65.
The effects of soil type, depth of sowing, variety of vegetable, and conditions of application on the herbicidal and injurious properties of 2,4-D when used as a pre-emergence spray in glasshouses were studied at the Ohio State University. Field studies are also reported on the use of 2,4-D and other chemical herbicides on asparagus, sweet corn, snapbeans, lima beans, onions, spinach and strawberries.

3038. NIELSEN, W.
Weed equipment used in truck crops.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 85-6.
Truck crops are usually grown on beds, 40-42 inches from centre to centre. The spraying equipment generally used is of the wheel tractor-trailer or track-layer-trailer type, adapted for an 80-inch spread to run in the furrows. Sometimes a spray rig is used in which the tanks are mounted directly over the tracks. This type causes less damage to the beds in turning than the trailer type. The construction of a burner designed for weed control in onion fields is described.

3039. BARRONS, K. C., AND OTHERS.
Certain phenolic compounds for residual pre-emergence weed control in horticultural crops.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 34-9.
Residual pre-emergence weed control in several horticultural crops was obtained by spraying with pentachlorophenol and its sodium salt, and 4,6-dinitro-o-sec-butylphenol and its ammonium salt. The treatments were most suitable for large-seeded crops such as peas, beans and cucumbers, that are sown at a depth of 1½ in. or more. Small-seeded crops such as lettuce and onion were injured. Weed control was also obtained on potatoes, gladioli and asparagus without damage to the crop. Further trials are necessary before these sprays can be recommended for general use.—Dow Chemical Company.

3040. AUDUS, L. J.
Studies on the pH-relationships of root growth and its inhibition by 2,4-dichlorophenoxyacetic acid and coumarin.
New Phytol., 1949, **48**: 97-114, bibl. 34.
The results of experiments on cress, radish, garden pea and maize seedlings show increasing root-growth inhibition by 2,4-D with decreasing pH over the range 9·5-4·5. The root-growth inhibiting action of coumarin on those plants shows no such variation with pH.

There was, however, some indication that its stimulation of the activity of lateral root meristems, which occurs over the whole pH range, was greatest at the acid end.

3041. Sweet, R. D., and Havis, J. R.
Pre- and post-emergence chemical weeding of several vegetables.
Proc. N.E. States Weed Control Conf. 1948, pp. 89-96, bibl. 4.

The herbicidal values of 5 petroleum products, a dinitro compound, the methyl ester of naphthaleneacetic acid and the NH_4 salt of 2,4-D were studied. Treatment consisted of pre-emergence sprays of direct-seeded crops (radish, beets and spinach) and post-setting sprays of transplanted crops (tomatoes, cabbage, broccoli).—Cornell Univ.

3042. Parmelee, D. M.
Weed control experiments at Seabrook Farms.
Proc. N.E. States Weed Control Conf. 1948, pp. 64-9.

Results are given of field experiments in which chemical weed-killers are used on crops of beet, spinach and carrots. Commercial factors are considered.

3043. Danielson, L. L.
A progress report on chemical weed control in vegetable crops.
Proc. N.E. States Weed Control Conf. 1949, pp. 52-5.

Work on strawberries, sweet corn, parsley and carrots, onions, asparagus and potatoes is reported from the Virginia Truck Experiment Station, Norfolk.

3044. LeCompte, S. B., Jr.
Preliminary notes on chemical weeding of asparagus, the temperature-moisture index and sunshine.
Proc. N.E. States Weed Control Conf. 1949, pp. 56-67, bibl. 14.

This report of preliminary trials of 4 chemicals for weed control in asparagus beds is accompanied by data on weather conditions which prevailed during the experiments, in a valuable attempt to define the environmental conditions. Promising materials were 2,4-D as a pre-emergence spray, calcium cyanamid used during the cutting season, and potassium cyanate during growth of the brush.—Rutgers Univ., N.J.

3045. Luecke, R. W., Hamner, C. L., and Sell, H. M.
Effect of 2,4-dichlorophenoxyacetic acid on the content of thiamine, riboflavin, nicotinic acid, pantothenic acid and carotene in stems and leaves of red kidney bean plants.
Plant Physiol., 1949, **24**: 546-8, bibl. 9.

The quantity of certain vitamins in the leaves and stems of red kidney bean is altered considerably by treatment with 2,4-D. In leaves of treated plants the thiamine, riboflavin, nicotinic acid and carotene content was lower than in leaves of the controls, while the pantothenic acid content was higher. In stems of treated plants the thiamine, riboflavin, nicotinic acid and pantothenic acid content was much greater, but there was only two-thirds the amount of carotene.—Michigan State College, East Lansing.

3046. Linder, P. J., Brown, J. W., and Mitchell, J. W.
Movement of externally applied phenoxy compounds in bean plants in relation to conditions favoring carbohydrate translocation.
Bot. Gaz., 1949, **110**: 628-32, bibl. 4, illus.

The translocation of stimulus of 2,4-D and other growth regulators of the phenoxy type from the leaves to the stem is shown to be associated with conditions favourable for the movement of photosynthate from the leaves, irrespective of the type of phenoxy compound used, the amount applied, or the kind of carrier employed.—U.S.D.A., Beltsville.

3047. King, L. J., and Lambrech, J. A.
A new chemical for use in pre-emergence weeding.
Proc. N.E. States Weed Control Conf. 1949, pp. 34-6.

Sodium 2-(2,4-dichlorophenoxy) ethyl sulphate is reported as toxic to germinating weed seeds when applied to the soil. Field tests showed that at rates of 3 lb./acre germinating seeds of crabgrass, purslane, carpet weed and low ragweed were killed. Good weed control was obtained in fields of snapbeans and small-seeded lima beans by pre-emergence sprays. Although chemically related to 2,4-D, the physiological effects of this herbicide are very different. Foliage applications to such sensitive plants as tomatoes result in no epinastic responses and only slight formative effects.—Boyce Thompson Inst., Yonkers, N.Y.

3048. Noll, C. J., and Odland, M. L.
Chemical weed control in horticultural crops at the Pennsylvania State College.
Proc. N.E. States Weed Control Conf. 1949, pp. 37-42.

By pre-emergence sprays on lima beans, string beans, beets, spinach and sweet corn, and pre- and post-emergence sprays on asparagus.

3049. Marth, P. C., and Mitchell, J. W.
Comparative volatility of various forms of 2,4-D.
Bot. Gaz., 1949, **110**: 632-6.

In biological tests with young bean and tomato plants, the relative volatility of various salts and esters of 2,4-D were compared. The sodium salt, triethanolamine salt, and amide forms were found to be non-volatile, but all the esters tested volatilized and produced growth effects on the plants. Differences in volatility of the esters were determined. When dissolved in certain oils, such as cotton seed, corn and diesel, the volatilization of the esters was greatly reduced.—U.S.D.A., Beltsville.

3050. Kelly, S.
The effect of temperature on the susceptibility of plants to 2,4-D.
Plant Physiol., 1949, **24**: 534-6, bibl. 4, illus.

Plants of red kidney beans, perennial rye and crab-grass were shown to be more susceptible to 2,4-D at high temperatures than at lower ones. This increased response occurred even when the plants were moved to higher temperatures a week after treatment. Pre-treatment of the plants with higher temperatures also

increased their response to 2,4-D.—Vassar College, Poughkeepsie, N.Y.

3051. MULLISON, W. R.
The volatility of several salts and esters of 2,4-D as determined by the response of tomato, bean, and cotton plants.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 281-90, bibl. 3.

Trials and observations by the author, who is on the staff of the Dow Chemical Co., Midland, Mich., strongly indicate to him that unsprayed plants adjacent to or near plants treated for weed control will not be affected by volatilization of 2,4-dichlorophenoxyacetic acid, its sodium or alkanolamine salt.

3052. MINSHALL, W. H., AND HELSON, V. A.
The herbicidal action of oils.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 294-8, bibl. 29.

A short survey of published literature is followed by a note of work at Ottawa on the effect of a petroleum naphtha on the photosynthesis and respiration of leaves of carrot, parsnip, etc.

3053. ELLIS, N. K.
Potassium cyanate as a weed control chemical for onions.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 48-51, bibl. 1.

Experiments reported from Purdue University show that potassium cyanate can be used successfully as a herbicide in onion crops if a total of 20 lb. per acre is used in 2 applications. Applications at the cotyledon stage and when three true leaves have appeared are recommended.

3054. LACHMAN, W. H.
Weed control in onions grown from sets.
Proc. N.E. States Weed Control Conf. 1949, pp. 88-97, bibl. 17.

A 2% solution of potassium cyanate at the rate of 80 gal. per acre was found to give good control of annual weeds in fields of onion sets. This herbicide should be used as a side spray, as an overall application will reduce yields. A pre-emergence application of 75-150 lb. cyanamid dust per acre was a valuable supplement to the suggested spray programme with potassium cyanate.—Mass. agric. Exp. Stat.

3055. HEDLIN, W. A.
Chemical weed control in onions.
Proc. N.E. States Weed Control Conf. 1948, pp. 69-73, being *Pap. Dep. Veg. Crops, Cornell Univ.* **291**.

Cyanamid should not be applied at more than 60-70 lb. per acre in pre- or post-emergence treatments, and foliage should be wet at the time of application. KOCN can be used as a selective weed-killer if low concentrations are used when both onions and weeds are still small; the foliage in this case should be dry.

3056. NYGREN, A.
Cytological studies of the effect of 2,4-dichlorophenoxyacetic acid, 2-methyl,4-chlorophenoxyacetic acid, and 2,4,5-trichlorophenoxyacetic acid on *Allium cepa*. Preliminary report.
Ann. roy. agric. Coll. Sweden, 1949, **16**: 723-8, bibl. 15.

At higher concentrations the chemicals were found to cause severe disturbance of mitosis in onion root tips. It is therefore considered unsafe to use these herbicides on seed crops or on breeding material at a concentration higher than 0·001 mol. The effect of the chemicals on mitosis is illustrated by drawings and micro-photographs.

3057. WARREN, G. F.
Pre-emergence treatments for onions, lima beans, beets and asparagus.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 39-44.

A summary of some of the investigations on pre-emergence weed control in vegetable crops made at the University of Wisconsin during the last 4 years. It is concluded that the contact type of pre-emergence treatment on onions grown on peat soil is promising, but 2,4-D used for residual effect is too dangerous for commercial use. 2,4-D and PCP gave good results in lima beans, and banded applications of borax in beet fields. A trial comparing 2,4-D and cyanamide for weed control in asparagus gave inconclusive results.

3058. NYLUND, R. E.
Chemical control of weeds in onions by post-emergence sprays.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 45-7, bibl. 11.

A brief survey of the search for a selective weed-killer for onions, and a summary of the work done at the University of Minnesota on post-emergence onion weed control. The results show that environmental factors affect the sensitivity of the onion plant to the chemical to an extent that makes selective weed-killing difficult.

3059. BAKKE, A. L.
Experiments on the control of weeds in onions grown on peat soil by the use of chemicals.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 51-8.

A report of pilot trials at the Iowa Agricultural Experiment Station. Promising results were given by Santobrite (sodium pentachlorophenate) and aerocyanate as post-emergence sprays, and by the ester of 2,4-D at 2 lb. per acre as a pre-emergence spray. The value of a combination of the two treatments is suggested.

3060. JACOB, W. C.
Pre-emergence chemical weeding of potatoes on Long Island.
Proc. N.E. States Weed Control Conf. 1948, pp. 74-80.

The report of an experiment conducted at Long Island Vegetable Research Farm, Riverhead, N.Y., to determine the best concentrations and times of application of 5 chemical herbicides. Dowspray 66 Improved at 3 gal., Sinox General at 2 and 3 pints, and cyanamid at 100 lb. per acre, applied at the time of emergence of the potato plants, all gave successful control of weeds without reduction in crop yield.

3061. SMITH, O., MARSHALL, E. R., AND MEADOWS, M. W.
Combinations of chemicals for weed control.
Proc. N.E. States Weed Control Conf. 1949, pp. 193-5.

The report of an experiment to determine the minimum effective concentrations of 6 chemicals, singly and in combination, for pre-emergence weed control in potatoes.—Cornell Univ.

3062. SMITH, O., MARSHALL, E. R., AND MEADOWS, M. W.
Revolutionary changes in potato production as a result of weed control.
Proc. N.E. States Weed Control Conf. 1949, pp. 126-30.

The use of chemical weed-killers in potato crops may make changes in spacing, fertilizing and irrigation practices desirable. The effect on yield of such changes in combination with chemical and cultural weed control was investigated. Yields of U.S. No. 1 size tubers were not affected by any of the treatments, but total yields and yields of No. 2 size tubers were greatly increased by close spacing. There are indications that 2,4-D applications reduced total yields in comparison with wheel hoeing and tractor cultivation. —Cornell Univ., Ithaca.

3063. JACOBS, W. C., AND SCUDDER, W. T.
Chemical weed control in potatoes on Long Island.
Proc. N.E. States Weed Control Conf. 1949, pp. 114-21.

A comparison of herbicides, concentrations and times of application. Post-emergence application of most of the materials used injured the potato crop. None of the chemically treated plots yielded so well as the normally cultivated plots. To obtain optimum weed control with minimum crop injury, materials should be applied as near as possible to the time of emergence of the potatoes.—Cornell Univ., Ithaca.

3064. ELLIS, N. K.
The effect on the yield of potatoes of incorporating 2,4-D in the regular spray.
Amer. Potato J., 1949, **26**: 208-13, bibl. 4.

The use of 2,4-D, especially its acid equivalent as sodium salt, gives promise for the control of weeds, but cannot be recommended in lieu of cultivation as yet.—Lafayette, Ind.

3065. DEARBORN, C. H.
Productivity of cultivated and uncultivated Golden Cross Bantam sweet corn weeded with post-emergence sprays of 2,4-D.
Proc. N.E. States Weed Control Conf. 1949, pp. 69-72, bibl. 3.

Experiments made at the New York Agricultural Experiment Station, Geneva, show that cultivation is necessary in conjunction with a 2,4-D spray where grasses and other weeds persist after spraying. There are also indications that the productivity of sweet corn is improved by cultivation to break up the 2,4-D layer on the surface of the ground, when the post-emergence treatment exceeds 0·7 lb. per acre acid equivalent.

3066. HAVIS, J. R., AND SWEET, R. D.
Response of 8 varieties of sweet corn to post-emergence treatment of 2,4-D.
Proc. N.E. States Weed Control Conf. 1949, pp. 73-6, bibl. 2.

Seneca Dawn and North Star were most susceptible to 2,4-D damage, Marcross, Lincoln and Ioana least susceptible, and Carmelcross, Spancross and Golden Cross intermediate. 2,4-D caused no reduction in yield in any of these varieties. The effect of 2,4-D on the lodging of sweet corn is noted.

3067. DEARBORN, C. H.
Weeding sweet corn with 2,4-D, effects of timing, rates and varieties.
Proc. N.E. States Weed Control Conf. 1948, pp. 82-8, bibl. 2.

Treatment with 2,4-D at rates of 0·2, 0·4 and 0·8 lb. of the acid per acre during July and August did not adversely affect the yield of sweet corn; in fact applications on 14th or 21st July increased the yield. Of the 8 varieties studied, Seneca Dawn and North Star were most susceptible to 2,4-D damage, and Lincoln and Ioana least.—N.Y. Agric. Exp. Stat.

Weed control in ornamentals.

3068. ELDER, W. C., ELWELL, H. M., AND ROMSHE, F. A.
Chemical control of weeds and brush in Oklahoma.
Bull. Okla agric. Exp. Stat. **B-335**, 1949, pp. 26.

Includes weed control in lawns and 8 horticultural crops.

3069. PRIDHAM, A. M. S., AND OTHERS.
Chemical weed control in ornamental plantings.
Proc. N.E. States Weed Control Conf. 1948, pp. 131-54, bibl. 4.

A brief outline of the possibility of weed control by pre-planting, pre-emergence and post-emergence treatments is followed by a detailed account of experiments in pre-planting treatment for the control of quack grass, *Artemisia vulgaris* and *Cyperus esculentus*. 2,4-D and ammonium sulphocyanate successfully eliminated all 3 weeds in uncropped land. The residual effect of these chemicals in clay loams was approximately 90 days, and on sandy soils 120 days. These figures indicate the possibility of early autumn treatment followed by spring planting.—Cornell Univ.

3070. PRIDHAM, A. M. S.
Response of woody ornamentals to 2,4-D.
Proc. N.E. States Weed Control Conf. 1948, pp. 122-3.

Injury to woody ornamentals from 2,4-D can be minimized or eliminated by spraying during the dormant season.

3071. DEFRANCE, J. A.
Crab grass control in turf.
Proc. N.E. States Weed Control Conf. 1948, pp. 99-112, bibl. 28.

Extensive trials on lawns and putting-green turf showed clearly that certain formulations of phenyl mercury complexes give satisfactory control of crab grass (*Digitaria* spp.) without injury to the permanent grasses. They also gave control of some turf diseases, especially dollar-spot. As a preventive against crab grass and certain diseases it is suggested that

applications be made once a month from June to September.—Rhode Island State College.

Noted.

3072.

a CAMPBELL, J. C., AND WOLF, D. E.
1948 results of weed control in potatoes with cyanamid and 2,4-D.
Proc. N.E. States Weed Control Conf. 1949, pp. 122-4.

b COOK, S.
Weed control in potatoes by cultivation, flame and various chemicals.
Proc. N.E. States Weed Control Conf. 1948, pp. 80-2.

c ENGEL, R. E., AND WOLF, D. E.
Chemicals for crab grass control.
Proc. N.E. States Weed Control Conf. 1949, pp. 159-63.

d HAMNER, C. L.
Factors affecting the action of 2,4-D.
Proc. N.E. States Weed Control Conf. 1949, pp. 20-3, bibl. 10.

e HODGDON, A. R.
Preliminary report on quack grass (*Agropyron repens*) eradication with ammonium trichloroacetate and sodium trichloroacetate under field conditions.
Proc. N.E. States Weed Control Conf. 1949, pp. 201-5, bibl. 3.

f JACOB, W. C., AND SCUDDER, W. T.
Pre-emergence chemical weeding of lima beans and cauliflower on Long Island.
Proc. N.E. States Weed Control Conf. 1949, pp. 77-83.

g MACDONALD, W. P.
Spraying equipment for herbicides and other methods of application.
Proc. 5th annu. Meet. N. Cent. Weed Control Conf. Ill., 1948, pp. 158-65.

h MAHLSTEDT, J. F.
Problems in manufacturing of ground weed spray equipment.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 87-8.

i MEADOWS, M. W., AND SMITH, O.
Effect of temperature, organic matter, pH and rates of application on persistence of 2,4-D in soil.
Proc. N.E. States Weed Control Conf. 1949, pp. 24-9, bibl. 3.

j VAN OVERBEEK, [J.].
[A biochemical explanation of the herbicidal action of 2,4-D.]
Proc. 10th annu. Western Weed Control Conf. Calif., 1948, pp. 51-2.

k PRINCE, A. E.
Control of woody plant weeds in blueberries with 2,4-D materials.
Proc. N.E. States Weed Control Conf. 1949, pp. 43-8, bibl. 2.

l RAHN, E. M., AND SCHELL, C. E.
Chemical weed control in sweet corn and asparagus.
Proc. N.E. States Weed Control Conf. 1949, p. 68.

m RALEIGH, S. M.
Chemical control of quack grass.
Proc. N.E. States Weed Control Conf. 1949, p. 206.

n SCHIEDER, E.
Problems in developing helicopter weed spraying equipment.
Proc. 1st annu. Calif. Weed Conf., 1949, pp. 89-90.

o SMITH, O., MEADOWS, M. W., AND MARSHALL, E. R.
Control of weeds in potatoes by pre-emergence sprays.
Proc. N.E. States Weed Control Conf. 1949, pp. 98-113.

VEGETABLES AND MISCELLANEOUS TEMPERATE CROPS.

General.

(*See also* 2681-2683, 2691-2708, 2973, 3523, 3531, 3561, 3563, 3565, 3566, 3569, 3573, 3576.)

3073. SECRETT, F. A.
Horticultural crops in relation to water.
Advanc. Sci., 1949, **6**: 128-30.

The substance of a paper read to the British Association in September, 1948. After stressing the need for irrigation in the dryer parts of Britain (rainfall 24 in. a year) the author reports the results from irrigation trials (" artificial rain ") at Milford with and without potassium nitrate in the water. Some of the many benefits of an irrigation plant are enumerated. The view is expressed that without increasing the present national vegetable acreage by a single acre, a 50% increase in the quantity of vegetables grown could be achieved by giving the land all it required in knowledge, thought, skill, cultivation and fertility.

3074. SCHUPHAN, W.
Aktuelle Fragen im Gemüsebau. **(Present day problems in vegetable growing.)**
Agrarwiss. u. Agrarpolitik, 1949, **H.14**, pp. 97-113, bibl. 5.

In a paper read at a meeting of the agricultural faculty of Bonn University the author develops some of his ideas elaborated in his book. [See *H.A.*, 18: 3110.]

3075. DOMINION OF CANADA, DEPARTMENT OF AGRICULTURE, DIVISION OF ENTOMOLOGY.
Processed Publications, Entomological Series, 1948.

The following have recently been received:—

No. 51. Control of tobacco cutworms, pp. 3 (by Fox, C. J., and Goble, H. W.).

No. 56. Control of hornworms attacking tobacco in Eastern Canada [*Protoparce quinquemaculata* and *Apanteles congegatus*], pp. 5 (by Stirrett, G. M., and Fox, C. J.).

No. 93. Potato leafhopper [*Empoasca fabae*], pp. 3 (by Cannon, F. M.).
No. 95. Potato aphids [*Myzus persicae, Macrosiphum solanifolii, Aphis abbreviata, Myzus convolvuli*], pp. 3 (by Adams, J. B.).
No. 99. Tomato hornworm [*Apanteles congregatus*], pp. 4 (by Fox, C. J.).
No. 103. Asparagus beetles [*Crioceris asparagi* and *C. duodecimpunctata*], pp. 3 (by Armand, J. E.).

3076. HRISTEVA, L. A., AND OTHERS.
The effect of humic acid on the development of roots in various agricultural plants. [Russian.]
Doklady vsesojuz. Akad. selsk. Nauk S.S.S.R., 1949, No. 8, pp. 23-8, bibl. 5.
Humic acid at a concentration of 0·001 and 0·0001%, when added to nutrient medium at the beginning of the plant's development, stimulates the increase in length of the primary roots and the formation of the secondary roots. The most active humic acid in this connexion was that of peat and soil. The stimulating effect of humic acid is associated with its physico-chemical properties. The effect is even greater with the humates of sodium, ammonium, and potassium. The plants used were mostly gramineae but included tomato and kok saghyz.

3077. AFANASJEVA, L. I.
Recognizing the manurial needs of cultivated plants by external symptoms. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 5, pp. 55-6.
An account is given of the general symptoms of deficiencies of nitrogen, phosphorus and potassium in vegetables, with examples of special cases. The quantities of fertilizers recommended for supplying these elements in requisite amounts are tabulated for cucumbers, onions, beetroot, carrots, cabbages and tomatoes.

3078. HEWITT, E. J.
The resolution of the factors in soil acidity. IV. The relative effects of aluminium and manganese toxicities on some farm and market garden crops (cont.).
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 58-65.
The author records the visual symptoms and tissue test levels of aluminium and manganese in twenty crops, mainly vegetable, grown in sand culture. Manganese toxicity symptoms were distinct but diverse. Aluminium toxicity symptoms were more uniform and seemed to induce phosphorus deficiency in most crops. Combined excess of aluminium and manganese generally accentuated manganese toxicity symptoms and often slightly reduced the phosphorus deficiency effect.

3079. HEWITT, E. J.
Experiments on iron metabolism in plants. I. Some effects of metal-induced iron deficiency.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 66-80, bibl. 25.
Results of the author's sand culture experiments on sugar beet, oat, tomato, potato and kale, in which the effects of excess of Mn, Cr, Co, Ni, Cu, Zn and other metals on the iron status of these crops were studied, lead him to the following conclusions:—"The evidence considered here shows that the problems of metal-induced iron deficiency are complex. Manganese is not unique in its ability to cause chlorosis and several metals are far more active in this respect. Observations of simultaneous symptoms of iron and manganese deficiencies in the same plant, and the distinction between manganese toxicity and iron deficiency, clearly imply some independent functions for these elements. The functional status of ferrous and ferric iron in chlorophyll formation is still not clear and the cause of induced iron deficiency cannot yet be specified in terms of their equilibrium. Hypotheses based on the relative oxidation-reduction potentials of *simple* ions of the metals considered appear inadequate to explain their activity and more than one mechanism may be involved."

3080. HEWITT, E. J., AND JONES, E. W.
Molybdenum as a plant nutrient. The effects of molybdenum deficiency on some vegetables, cereals and forage crops.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 81-90, bibl. 10.
In the vegetables in these sand trials, marked visual effects attributed to molybdenum deficiency were seen in swedes and tomatoes. Symptoms resembling N deficiency were seen in peas, dwarf and broad beans and celery. Severe symptoms were accompanied by marked diminution in crop. A tentative method is described for the preparation of ferric citrate free from Mn, Zn, Cu, Ga and Mo. The relation of molybdenum deficiency to certain aspects of nitrogen metabolism is discussed.

3081. NICHOLAS, D. J. D.
The relation between the Waring blendor method and other procedures for the diagnosis of the mineral status of crop plants.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 98-113, bibl. 11.
The blendor consists of a glass vessel fitted at the base with 4 stainless steel blades on a steel pivot which revolves at high speed. It was used for determining the mineral status of K, Mg, Ca, PO_4, Cl and Mn in potato, cauliflower, broad bean, apple and other crops grown at different centres. Comparisons made between Waring blendor, diffusion and ash analysis data showed that the three methods gave values at different levels but that these were roughly in parallel. The Waring blendor method is probably quicker in operation than the diffusion method and is also a more standardized procedure. It cannot, however, be used in the field.

3082. FENNAH, R. G.
Field tests with DDT against insect pests of food-crops in the Lesser Antilles.
Trop. Agriculture Trin., 1948, **25**: 45-52, bibl. 1.
Aqueous dilutions to a concentration of 2-4% DDT of a stock emulsion comprising DDT 15%, tetralin (tetrahydronaphthalene) 26%, Triton B 1956 4%, soap 0·4%, and water 54·6% were found effective in

field trials conducted in Antigua, B.W.I., when applied to give a deposit of 0·04-0·17 mg. DDT/cm² against *Ascia monuste*, *Plutella maculipennis* and *Liriomyza pusilla* on cabbage, *Nezara viridula* on tomatoes, *Corythaica planaris* on eggplant, *Agromyza* sp. and *Liriomyza pusilla* and *Thrips tabaci* on onions. A spray of 3% DDT emulsion applied to both leaf surfaces on closely-planted turnips proved more effective against *Aphis gossypii* than when applied to the upper surface only, but after three weeks it failed to retard multiplication of the pest. [From author's summary.]

3083. GALLAWAY, H. E.
Melanoplus occidentalis occidentalis a range species of grasshopper in Nevada.
J. econ. Ent., 1948, **41**: 925-7.

"In Nevada, for the past 10 or more years, this species has deviated from the solitary existence, developed migratory habits and has become of economic importance." Garden crops such as potatoes, onions, maize, lettuce, beets and radish have been completely destroyed. An account of its spread, habits and control is given.—Nevada St. Dep. Agric., Reno.

3084. HENSILL, G. S.
Insecticide treatment of seeds.
Agric. Chemls, 1949, **4**: 9: 29-30.

Experiments [no details given] have shown that the pure gamma isomer of hexachlorocyclohexane applied to the seed as a dry dust or in a slurry affords excellent protection against soil pests. It is estimated that 55-75%, in some instances up to 90%, of the larger wireworms come up to the seed, which acts as a bait, and are killed. The treatment does not affect wireworms deep down in the soil, but these do little injury to the crop when they come up later in the season. Formulations containing 25 and 75% of the pure gamma isomer appear to lend themselves best to the dry and wet treatment respectively. The amount of insecticide to be used on seeds of beans, lima beans, peas, cucumber and tomatoes, among other crops, is tabulated.

Garden vegetables.

(*See also* 2675, 2679, 2889, 2932, 2934, 2936, 2979, 3037-3059, 3400, 3401, 3549, 3559, 3582-3584.)

3085. GREEN, E. E.
Some notes on dwarf vegetables.
Nat. hort. Mag., 1949, **28**: 97-8.

Among midgets briefly described are varieties of sweet corn, cucumber, water melon, musk melon, pumpkin and tomato. Most of them appear to offer some advantage in rate of growth, flavour, or other character which would commend them to the gardener.

3086. WALKOF, C.
Breeding vegetables for the prairies.
[*Mimeo.*] *Rep. Proc. 5th ann. Meet. West Canadian Soc. Hort.*, 1949, pp. 6-10, bibl. 6.

The main desiderata in breeding vegetables for prairie conditions are: earliness (the growing season may be only 75-77 days), tolerance of wet or dry conditions, frost hardiness, reasonably high yield. Breeding methods are described.

3087. LAMM, R., TOMETORP, G., AND HINTZE, S.
Klassificerande sort- och stamförsök med köksväxter 1945-1948. **(Vegetable variety trials in Sweden 1945-1948.)** [English summary 3 pp.]
Reprinted from *Årsskr. Lantbr.- Trädgårdsinst.*, 1949, pp. 97-152, bibl. 26, being *Medd. Trädgårdsförs.* **53**.

A further report on new vegetable varieties and strains tested at Alnarp and adjudged "first-class".

3088. ROYAL HORTICULTURAL SOCIETY.
Wisley trials, 1948. [Cauliflowers, cabbage lettuce and summer radish.]
J. roy. hort. Soc., 1949, **74**: 409-14.

Brief observations on the performance of numerous varieties submitted for trial. No yield figures are given.

3089. SHERBAKOFF, C. D.
Breeding for resistance to _Fusarium_ and _Verticillium_ wilt.
Bot. Rev., 1949, **15**: 377-422, bibl. 205.

A review of the work that has been done with the various crop plants susceptible to these diseases. Breeding for resistance to *Fusarium* wilt has been extensive, and in some instances, notably with asters, cabbage, celery, peas, sweet potato, tomato and watermelon, remarkably successful. There has, however, been relatively little breeding for resistance to *Verticillium* wilt, although good results have been achieved with mint.

3090. ELLIS, D. E.
Control root-knot in the vegetable garden.
Exten. Circ. N.C. State Coll. Agric. **337**, 1949, pp. 12.

This circular discusses control of eelworm *Heterodera marioni* by early planting, crop rotation, and soil treatment. Effective chemical soil treatment can be obtained with chloropicrin, dichloro-propene-dichloropropane mixture, ethylene dibromide, and urea. A table shows dosage, cost, method of application, relative effectiveness and time of treatment for these substances.

3091. ROSELLA, E.
L'abatardissement de l'artichaut. **(Degeneration of the globe artichoke.)**
Rev. hort. Paris, 1949, **121**: 70-1, illus.

An increasing number of late flowering plants are appearing in the N. African plantations of globe artichokes. This undesirable character is associated with a pale, much-divided leaf, and has been attributed to a virus infection. The author, however, believes that it might be due to the fact that these late-flowering plants send up more suckers than the early strains, and their numbers are naturally being increased by indiscriminate propagation. Careful selection of parent plants in the field, as well as selection in the nursery, is recommended. Division of selected roots instead of propagation by suckers is suggested as a means of ensuring good planting material.

3092. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Kulturforsøg med Asparges. **(Asparagus trials.)**
Tidsskr. Planteavl, 1949 (?), **52**: 715-16, being *Medd. Statens Forsøgvirks. Plantekult.* **420**.

In spacing trials, carried out in the sandy soil of Spangsbjerg in the years 1939-47, it was found that the optimum distances for larger plantings are about 2 m. between the rows and 30-35 cm. in the row. Where the beds are set up by hand, the distance between rows may be reduced to 1·5 m. Green asparagus, which is hardly known in Denmark, gave higher yields than blanched asparagus, the latter producing thicker, though fewer, shoots.

3093. CAROLUS, R. L.
Yield and quality of asparagus harvested by the field snapping method.
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 370-7, bibl. 4.

When properly harvested, the snapped product is relatively free of objectionable fibre and capable of being harvested by the grower and handled by the canner at a 50% reduction in labour cost. In addition, the yielding ability of the planting is not impaired, but, from the results obtained in the tests reported here, may be increased by from 10 to 15%. To obtain an acceptable product the spear must be broken with the pressure applied by the thumb and fingers at a point not far below the top. Snapped asparagus is more succulent, has a higher rate of respiration, and loses weight more rapidly than cut asparagus. This makes it necessary that it should be quickly canned. [From author's conclusions.]

3094. NILSSON, F.
Lokala sortförsök med bryt-, skär- och bönor 1938-1947. **(Swedish variety trials with dwarf beans, 1938-1947.)** [English summary 1½ pp.]
Reprinted from *Årsskr. Lantbr.- Trädgårdsinst.*, 1949, pp. 29-96, bibl. 15, being *Medd. Trädgårdsförs.* **52**.

The trials were carried out at different places in Sweden with varieties of stringless French beans, string beans and wax beans.

3095. DE OLIVEIRA, A. J.
Subsídios para a descrição e classificação das formas cultivadas do feijão vulgar. **(A classification of cultivated forms of French beans.)**
Rev. agron. Lisboa, 1946, **34**: 317-48, illus.

Various systems of classification for French beans are outlined. A new identification key for the varieties of *Phaseolus vulgaris* and *P. coccineus* commonly grown in Portugal is drawn up, in which all important plant characters are used. This is compared with a key previously published by the author [see *H.A.*, 18: 1151] in which identification was based mainly on external seed characters.

3096. STILES, I. E.
Relation of water to the germination of bean seeds.
Plant Physiol., 1949, **24**: 540-5, bibl. 1.

A quantitative study was made of the course of water absorption during germination by seeds of *Phaseolus lunatus* var. Florida, Speckled Butter, *P. coccineus* var. Rubronanus, *P. vulgaris* var. Pinto, and *Glycine max* var. Arksoy, 2913. It is shown that varieties differ in the total amount of water absorbed and in the rate of absorption; that the seed coat acts as a transporting organ for water, and the cotyledons as water reservoirs but not as actively absorbing structures; and that the water requirements for germination of the different varieties indicate their suitability for hydric, mesic or xeric conditions.—Univ. of Texas, Austin.

3097. TOWNSEND, G. R., AND RUEHLE, G. D.
Diseases of beans in southern Florida.
Bull. Fla agric. Exp. Stat. **439**, 1947, pp. 56, bibl. 35, illus. [received 1949].

The bulletin describes diseases of beans caused by nutritional disorders (deficiencies of copper, manganese and zinc), bacteria, and fungi, and injuries due to other causes (e.g. root-knot, wind, water, unfavourable temperatures, and sprays). Control measures are discussed under exclusion, eradication, immunization, and protection.

3098. BAWDEN, F. C., AND VAN DER WANT, J. P. H.
Bean stipple-streak caused by a tobacco necrosis virus. [Dutch summary ½ p.]
Tijdschr. PlZiekt., 1949, **55**: 142-50, bibl. 13, illus.

Stipple-streak of French bean, a serious disease in some parts of the Netherlands, is caused by a strain of the Rothamsted tobacco necrosis virus. It can invade stems and leaves when introduced into roots.

3099. REID, W. D.
Control of halo-blight of beans.
N.Z. J. Sci. Tech., 1948, **30**, Sec. A, pp. 45-6, bibl. 2.

The results of trials here recorded, together with those previously reported (*H.A.*, 16: 943), show that halo-blight of beans (*Pseudomonas medicaginis* var. *phaseolicola*) can be readily controlled by use of bordeaux and Cuprox sprays. At least 3 applications are advisable from the seedling stage to crop harvest.

3100. PATEL, M. K., KULKARNI, Y. S., AND DHANDE, G. W.
A new *Synchytrium* on *Phaseolus mungo* [in India].
Curr. Sci., 1949, **18**: 171.

A letter describing, in English and Latin, a *Synchytrium* sp. causing defoliation of udid (*P. mungo*). The name *Synchytrium phaseoli* sp. nov. has been assigned to it by the authors.—Plant Path. Lab., Poona.

3101. RISTICH, S. S., AND SCHWARDT, H. H.
Biology and control of the seed-corn maggot on beans in New York.
J. econ. Ent., 1949, **42**: 77-80, bibl. 3.

Seed treatment gives little promise as a control measure for the seed corn maggot (*Hylemyia cilicrura*). Chlordan and benzene hexachloride dusts used as soil treatments reduced maggot injury, and the latter had a limited residual toxicity usefulness. Both insecticides imparted a flavour to dried beans. [From authors' summary.]

3102. GARMAN, P., AND KENNEDY, B. H.
Effect of soil fertilization on the rate of reproduction of the two-spotted spider mite.
J. econ. Ent., 1949, **42**: 157-8, bibl. 3.

The experiments were carried out on bean plants. "In view of the evidence presented here as well as records of a confirmatory nature in the literature, it is

concluded that mite populations may easily fluctuate with the variable vigour of the host plant, due to heavy or light fertilization."

3103. SPEYER, W.
Beitrag zur Bekämpfung des Pferdebohnenkäfers *Bruchus rufimanus* Boh. **(Bean beetle control in broad beans.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 7-8.

The beetle was found to be susceptible to Nexit and Gesarol dust, but it is safer to kill the eggs with an E605 f (0·01 and 0·05%) or Nexen (0·2 and 0·5%) spray. The application should be made when the heads of the young larvae are clearly recognizable under the magnifying glass in about 50% of the eggs. In 1948 in Holstein the correct time was about 20th June.—Inst. vegetable and oil seed pests, Kiel-Kitzeberg.

3104. VAN DER LAAN, P. A.
Bestrijding van het katjang-vliegje door bespuitingen met DDT of HCH. **(Control of *Agromyza phaseoli* with DDT or HCH.)**
Landbouw., 1949, **21**: 277-81, bibl. 4, illus.

A brief survey of the work that has been done on control of the fly *Agromyza phaseoli*, a pest of bean seedlings, is followed by a report of the experiments made by the Instituut voor Plantenziekten, Buitenzorg, on its control with DDT and HCH. Both materials gave good commercial control. Three to six applications should be made at 2-day intervals starting as soon as the beans appear above ground. The experiments were chiefly with soybeans, but preliminary trials with French beans (*Phaseolus vulgaris*) indicate that the same control methods may be used.

3105. LAMM, R., AND ÅVALL, H.
Gödslingsförsök med kloakslam 1943-1947. **(Manurial trials with sewage sludge 1943-1947.)** [English summary 1 p.]
Reprinted from *Årsskr. Lantbr.- Trädgårdsinst.*, 1949, pp. 1-28, bibl. 14, being *Medd. Trädgårdsförs.* **51.**

The value of sewage sludge as a fertilizer and its composition is discussed. In trials with late cabbage, sludge from four different Swedish towns was beneficial, though it was inferior to artificial fertilizers or farmyard manure.

3106. THUNG, T. H.
Zwartrot van kool. **(Black rot of cabbage.)** [English summary 1 p.]
Landbouw, 1949, **21**: 259-66, bibl. 1.

The black rot organism (*Xanthomonas campestris*) causes serious loss in cabbage crops in Java, for the main commercial variety Roem van Enkhuizen is very susceptible. Trials designed to reveal resistant varieties were made in 1940 and 1941. The Cape cabbages, especially Late Giant, Early Drumhead, Early Sugar Loaf and Yellows' Resistant, showed the greatest degree of resistance.—Faculty of Agricultural Science, Buitenzorg.

3107. GREAVES, T., AND VENABLES, D. G.
The insecticidal control of cabbage pests [in Australia]: A summary of experimental results, 1944-48.
J. Coun. sci. indust. Res. Aust., 1948, **21**: 171-6, bibl. 1.

The following are among the conclusions drawn from this work: DDT is outstanding for the control of cabbage moth, *Plutella maculipennis*, and butterfly, *Pieris rapae*; extensive trials have shown that BHC is an inferior insecticide for this purpose; applications of HETP resulted in poor control. No single insecticide effectively controlled both cabbage moth and cabbage aphid. To obtain reasonable control of aphids, the concentration of DDT has to be increased to at least four times that required for moth control. The most effective dust was one containing 1% DDT plus 2·4% w/w nicotine* in an inert diluent, applied at fortnightly intervals. The most effective spray contained 0·1% DDT *plus* 0·125% HETP, freshly mixed. DDT-nicotine sulphate dusts, in which hydrated lime or other alkaline materials were used as diluent, failed to control cabbage moth; such alkalis react with DDT, greatly impairing the insecticidal qualities of the dust. The newer aphicides, HETP and BHC, were not so effective in hot weather against the cabbage aphid as dusts containing 2·4% w/w nicotine. When compared with DDT and the more efficient aphicides, insecticides such as lead arsenate, rotenone, pyrethrins, cryolite, white oil, " Ryanex ", and dithiocyanodiethyl ether, gave poor control.

3108. BRONSON, T. E., STONE, P. V., AND ALLEN, T. C.
Field . experiments with hexaethyl tetraphosphate for cabbage aphid control.
J. econ. Ent., 1949, **42**: 156-7, bibl. 2.

Applications of a 5% dust of the insecticide or a spray mixture containing 1 part of hexaethyl tetraphosphate to 800 gallons of water were found to give good control of cabbage aphid, *Brevicoryne brassicae*.

3109. HANSON, A. J., AND OTHERS.
Biology of the cabbage seedpod weevil in Northwestern Washington.
Bull. Wash. agric. Exp. Stats. **498**, 1948, pp. 15, bibl. 1, illus.

An account of the distribution, damage caused by food plants, life history, and parasites of the cabbage seedpod weevil, *Ceutorrhynchus assimilis* Paykull.

3110. STITT, L. L., AND EIDE, P. M.
New insecticides for cabbage maggot control in Western Washington.
J. econ. Ent., 1948, **41**: 865-9.

The effect of different methods, rates and forms of application of benzene hexachloride, chlordan, chlorinated camphene and calomel on *Hylemya brassicae*.

3111. DILLS, L. E., AND ODLAND, M. L.
Cabbage caterpillar insecticide tests.
J. econ. Ent., 1948, **41**: 948-50, bibl. 4.

Insecticide trials on cabbage infested with imported cabbage worm (*Pieris rapae*) and cabbage looper (*Trichoplusia ni*) are reported from the Pennsylvania Agricultural Experiment Station. Fourteen different materials were tested. DDT dust was found to be very satisfactory.

3112. RAMSEY, G. B., AND SMITH, M. A.
The occurrence of *Rhizoctonia* crater rot in Illinois-grown carrots.
Plant Dis. Reptr, 1949, **33**: 248-9, illus.

* 2·4% w/w nicotine=1 pt. Black Leaf 40 to 20 lb. dust.

Carrots removed from storage towards the latter part of February showed a little decay, and in March loss caused mainly by *Rhizoctonia carotae* varied in different lots from 5 to 90%. The brown craters varied from ¼ to 1 in. in diameter and from ⅛ to ½ in. deep.

3113. Orman, A. C.
Cauliflower growing: a profitable crop under a wide range of conditions.
Agric. Gaz. N.S.W., 1949, **60**: 171-6, 212-13.

Cauliflowers are normally a cold climate crop, but modern plant selection and the adoption of suitable cultural methods have enabled growers to produce crops almost to perfection in every district of New South Wales. Varieties are recommended for growing in the tableland, western, and coastal districts, and details are given of cultural operations, harvesting, marketing, defects, seed production, diseases and pests and their control.

3114. Jerna, G.
Il sedano ortaggio da esportazione. **(Celery for export.)**
Humus, 1949, **5**: 3: 14-18.

American methods including the use of boards or paper for blanching are described [incidentally much as set out in *Circ. Bull. Mich. agric. Exp. Stat.* **165** of 1938].

3115. Houston, B. R., and Kendrick, J. B.
A crater spot of celery petioles caused by *Rhizoctonia solani*.
Phytopathology, 1949, **39**: 470-4.

A petiole crater-spot of celery rather widely distributed in the Delta region of California and characterized by brown, ovoid, sunken lesions on the petioles, is caused by *Rhizoctonia solani*.—Univ. California.

3116. Fédération Nationale des Producteurs d'Endives.
L'endive. **(Chicory growing in France.)**
La Maison Rustique, Paris, 1948, pp. 36.

The hints on cultivation include forcing, pest and disease control, seed production and marketing. A few recipes are added. The booklet is illustrated.

3117. Sonnenschein, E.
Polyploidie okurky, vyvolana kolchicinem. **(Polyploidy of cucumbers produced by colchicine treatment.)** [Summaries in English and Russian.]
Sbornik československ. Akad. Zeměděl, 1949, **21**: 105-14, bibl. 41, illus.

Water solutions of colchicine at 0·1, 0·2, 0·3 and 0·4% were used to produce polyploid strains in two cucumber varieties; they were applied with cotton wool to the growing points of seedlings. The polyploid forms showed increased vigour, modified leaf and flower shape, shorter fruits and lower fertility. The chromosome number of the autotetraploid cucumbers was 4n(28). The best results were obtained with the 0·2 and 0·3% solutions.—State Institute for Horticultural Research, at Průhonice, Czechoslovakia.

3118. Kostoff, D., and Stoyloff, M.
Grafting experiments of cucumber upon squash.
C.R. Acad. bulg. Sci., 1948, **1**: 2: 49-50, bibl. 13.

Experiments carried out earlier were repeated on a larger scale and confirmed the preliminary results, viz. that grafting cucumbers on squash increases both yield and drought resistance. If the yield of watered, non-grafted cucumbers is designated as 100%, non-watered cucumber plants grafted on squash yielded 143·4%. The increase is attributed chiefly to the stronger root system of the squash, though the grafting operation as such seems to have some influence, watered cucumbers grafted on cucumbers yielding 109%. A further effect of grafting is the shortening of the vegetation period, which was most pronounced in the plants grafted on squash. In this case the amount of fruit produced per day averaged 6·51 g., as compared with 4·01 g. produced by non-grafted, watered cucumbers. The higher drought resistance of cucumbers grafted on squash is thought to be of practical importance under certain conditions. Precipitation was fairly heavy in the spring and early summer of the experimental period.

3119. Heuberger, J. W.
Report of the national cucurbit fungicide test—1948.
Plant Dis. Reptr, Suppl. **183**, 1949, pp. 137-44.

Dithane Z-78 was the best material in the 1948 test, on the basis of disease control, lack of injury, and yield.

3120. Atkins, J. G., Jr.
Fungicides and fall cucumbers in Louisiana.
Abstr. in *Phytopathology*, 1949, **39**: 494.

In 1947 and 1948 tests Dithane Z-78, Fermate, Zerlate, and Parzate gave good control of both downy mildew and anthracnose, but Parzate caused much damage to the plants.

3121. Reitsma, J., and Slooff, W. C.
A disease of eggplant fruits caused by *Phytophthora parasitica* Dastur and *Phytophthora palmivora* Butler.
Reprint from *Chron. Nat.*, 1947, **103**: 5, pp. 3, bibl. 15, illus. [received 1949].

Brown watersoaked patches on eggplant fruits were shown to be caused both by *Phytophthora parasitica* and *P. palmivora*. Both are soil-borne fungi and can be controlled by desiccation of the surface soil. Wide spacing of the plants (1 metre), clean weeding and adequate surface drainage are recommended. Affected fruits should be removed immediately. In heavily infested fields the fungus can be destroyed by a thorough irrigation.

3122. Goffart, H.
Älchen an Porree und ihre Bedeutung für das Auftreten von Pflanzenkrankheiten. **(Eelworms in leeks and their significance for the incidence of plant diseases.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 11-12.

The occurrence is recorded of *Pratylenchus pratensis* in leeks, where the eelworm produced symptoms which were at first attributed to physiological causes. Losses amounted to 65%. It is suggested that in the diagnosis of plant diseases insufficient attention is often paid to eelworms.

3123. Skillman, E. B.
National glasshouse lettuce trials: I and II.
N.A.A.S. Quart. Rev., 1949, **1**: 189-98; **2**: 41-3.

Part I describes trials (latin squares and randomized blocks) in the winter of 1947-8 in heated houses at 21 centres in England. Throughout this series of experiments the Cheshunt varieties proved to be the most satisfactory. There was little difference between Early Giant and 5B. Cheshunt Early Ball was a smaller lettuce. Blackpool was a good variety generally, but its quality and size varied from centre to centre. May Queen was a large, loose lettuce, and much later than other varieties in maturing. Gotte à Forcer could well have been planted more closely, it was a much smaller lettuce than the rest. Part II deals with trials of 7 varieties grown "cold". The available, incomplete, records indicate that for general market qualities there is practically nothing to choose between Gloria and May Queen. Attracte and Northern Queen were good lettuces on the whole, Attracte having the advantage in respect of marketable number and size of heart. Arctic King, although smaller than Winter Crop, hearted better and matured earlier. Cheshunt Early Ball was the smallest lettuce in the trial, but it hearted well and matured much earlier than the others.

3124. Thompson, R. C.
Progress is best lettuce for high temperatures.
Seed World, 1949, **65**: 1: 34-6.

Trials carried out at Beltsville showed that the lettuce variety Progress, released last year by the U.S.D.A. and N.J. agric. Exp. Stat., gave a 90% germination at temperatures of 80-85° F. This was outstandingly better than any of the other 7 commercial varieties tested.

3125. Vlamis, J.
Growth of lettuce and barley as influenced by degree of calcium saturation of soil.
Soil Sci., 1949, **67**: 453-66, bibl. 22, illus.

A soil derived from serpentine rock was tested for nutrient deficiencies on lettuce and barley grown in pots. Severe deficiencies of N and P and a slight deficiency of K were found. When N, P and K were all deficient, not only did low yields result, but also disease symptoms described as rosette in lettuce and as tip failure in barley. The leaf symptoms were reduced and the yields increased by addition of gypsum or by leaching with $CaSO_4$, in conjunction with the N, P, K nutrients. No improvement was observed from leaching with $MgSO_4$ or K_2SO_4. Ca-amberlite added to the soil with full nutrients produced healthy plants and excellent yields. The rosette symptoms were produced on lettuce plants grown in water-culture solutions low in Ca, and more severely in solutions low in Ca and high in Mg or K. Plant tissue analysis reveals this to be a function of the low-Ca status of the plants under the competitive influence of Mg or K. [From author's summary.]—Univ. California.

3126. Chupp, C., and Paddock, W. C.
Big-vein of lettuce in New York State.
Plant Dis. Reptr, 1949, **33**: 280-1.

The virus disease big-vein has been found sporadically on Long Island since 1934, but it is now appearing in epidemic form in other places. The losses on individual farms this year ranged from 10% to almost complete loss so that fields were ploughed under before harvest time. The commercial value was lowered most in the variety Big Boston, somewhat less in Iceberg, and appreciably less in the Cos or Romaine type.

3127. Thiem, H.
Erfolgreiche Versuche zur Bekämpfung von Drahtwürmern und Erdraupen an Kulturpflanzen. **(The control of wireworms and soil caterpillars in vegetables.)**
Reprinted from *Gartenbauforschung*, 1948, **H.2**, pp. 36-50, bibl. 6.

Lettuce was the crop most thoroughly studied in these experiments, which were concluded in 1944. Fumigation with carbon disulphide and watering the plants with a Gesapon (DDT) solution are the control measures discussed.

3128. Epps, J. M., and Sherbakoff, C. D.
The Miles watermelon.
Market Gr. J., 1949, **78**: 4: 5, illus.

The properties of the Miles watermelon, a new high-quality variety resistant to *Fusarium* wilt, are described. It was bred at the Mississippi Experiment Station and has been widely tested.

3129. Andrus, C. F.
Factors influencing breakage resistance in watermelons.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 319-22.

The greater part of resistance to breakage in watermelons is found to be due to characteristics not of the rind but of the flesh.

3130. Pimenova, A. S.
Diseases of melons and watermelons in northern regions [of Russia]. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 72-5, illus.

The diseases described are anthracnose [? *Colletotrichum lagenarium*], brown spots on fruit (*Scolecotrichum* sp.), brownish spots on young fruit (*Sporodesmium* sp.), fruit rot caused by *Fusarium* sp., powdery mildew [*Erysiphe cichoracearum*], fruit rots in the field and in storage (*Mucor* sp. and *Rhizopus* sp.). Control measures are described.

3131. Pound, G. S.
A virus disease of watermelon in Wisconsin incited by the tobacco ringspot virus.
J. agric. Res., 1949, **78**: 647-58, bibl. 16, illus.

A mosaic disease of watermelon and muskmelon in Wisconsin was found to be caused by a yellow strain of the tobacco ringspot virus.—Wisconsin Agricultural Experiment Station.

3132. Rodrigo, P. A., and Garcia, G. M.
Some study on the production of red globe onion seed, II [in the Philippines].
Philipp. J. Agric., 1947, **13**: 195-204, bibl. 2, illus. [received 1949].

A report on the results from a study (2nd series) of onion seed production undertaken in 1946-47. [Climatic data are omitted, unfortunately.]

3133. VORSTER, P. W.
A new early onion variety [for S. Africa]—"Texas Grano".
Fmg S. Afr., 1949, **24**: 315-16, 330, bibl. 1, illus.

Some particulars of the origin, characters, and performance in S. Africa of this promising American, short-day, variety. In 1947-8 trials its yields ranged from 679 to 1,200 bags (of 120 lb.) per morgen [=2⅛ acres], the percentage of bolters being 1·2 to 6·5. Its flavour is mild. Although not noted for keeping qualities it can be stored as long as the variety Cape Flat. It appears to have "great possibilities", especially in the Transvaal.

3134. LANDAU, N.
Effect of spacing on the bolting of onions.
Nature, 1949, **164**: 496-7, bibl. 2.

In connexion with a fertilizer experiment of factorial design it was noticed that bolting in onions was more prevalent round the edges of the plots than in the inside rows. The figures presented clearly prove the correctness of this observation. It is suggested that under conditions of ample N supply reduced competition for light favours bolting, the response to increased photosynthesis apparently being a greater readiness for flower-stalk formation.—N.A.A.S. exp. Husbandry Farm, Kirton, Boston, Lincs.

3135. BARTON, L. V.
Seed packets and onion seed viability.
Contr. Boyce Thompson Inst., 1949, **15**: 341-52, bibl. 7, illus.

The effect of previous conditions of storage on the germination capacity of onion seeds after packeting has been determined. It was found that low moisture content (3·5% of the dry weight of the seeds) and low temperature (5°C.) during storage increased the resistance of the seeds to harmful conditions following packeting for sale. Tin cans, which provide airtight packets, were far superior to kraft paper packets for maintaining the viability of onion seeds upon removal from storage rooms. Two metal foils, Metalam with a scrim backing, and vinyl-laminated aluminium foil, have been found to be satisfactory for moisture-resistant packeting of seeds and are described. [From author's summary.]

3136. JAKOWSKA, S.
Effects of *Bacterium tumefaciens* on *Allium cepa*.
Phytopathology, 1949, **39**: 683-705, bibl. 42, illus.

Inoculations on onion bulbs produced abnormal localized overgrowths.—Fordham University, New York City.

3137. GORENZ, A. M., LARSON, R. H., AND WALKER, J. C.
Factors affecting pathogenicity of pink root of onions.
J. agric. Res., 1949, **78**: 1-18, bibl. 9, illus.

The optimum temperature for growth of the various isolates of *Pyrenochaeta terrestris* tested was 24° or 28° C. The isolates grew well at hydrogen-ion levels between pH 4 to 8. Maximum pink root development in sand culture was at 28° C. Of 23 commercial varieties tested, Yellow Bermuda and Beltsville Bunching were the most resistant, while Excel, a selection from Yellow Bermuda, approached but did not equal Yellow Bermuda in resistance.

3138. DOUGLASS, J. R., AND SHIRCK, F. H.
Experiments for control of onion thrips.
J. econ. Ent., 1949, **42**: 68-72, bibl. 12.

Experiments were conducted at Twin Falls, Idaho, in 1945, 1946 and 1947 on the control of the onion thrips on bulb onions with different insecticides. Outstanding increases in yield were obtained with a spray containing DDT and nicotine sulphate. At the strengths tested this spray was superior to nicotine sulphate, DDT, or tartar emetic. [From authors' summary.]

3139. HAGEDORN, D. J., AND WALKER, J. C.
Wisconsin pea stunt, a newly described disease.
J. agric. Res., 1949, **78**: 617-26, illus.

An apparently new pea disease, the Wisconsin pea stunt, and its causal agent are described. The main symptoms on peas are severe plant stunt, rosette of the apical foliage, and premature death. All 18 pea varieties tested were infected. The pea aphid, *Illinoia pisi* (Kalt.), was found to be a vector of the virus.—Wisconsin Agricultural Experiment Station.

3140. WARK, D. C.
The treatment of pea seed carrying bacterial blight.
J. Aust. Inst. agric. Sci., 1949, **15**: 37-8, 41, bibl. 2.

Bacterial blight, a seed-borne disease of peas, caused by *Pseudomonas pisi*, has been serious in the Canberra district for some years. The amount of seed-borne infection of peas with bacterial blight has been considerably reduced by steeping the seed in a 1: 500 solution of mercury bichloride in 70% ethyl alcohol acidified with 3% of acetic acid and with 1: 20,000 gentian violet added. This treatment has little effect against a seed-borne fungal disease. Although effective against seed-borne bacterial diseases of beans, the reduction in germination of bean seed makes it an impracticable method for the control of these diseases. [Author's conclusion.]

3141. HARE, W. W., WALKER, J. C., AND DELWICHE, E. J.
Inheritance of a gene for near-wilt resistance in the garden pea.
J. agric. Res., 1949, **78**: 239-50, bibl. 13, illus.

A high type of resistance to near-wilt of garden pea (*Fusarium oxysporum* f. *pisi* race 2) is described. Evidence obtained shows that the inheritance of resistance is dependent on a single dominant gene.—Wisconsin Agricultural Experiment Station.

3142. HARE, W. W.
Tip blight of garden pea.
J. agric. Res., 1949, **78**: 311-24, bibl. 14, illus.

A new disease of garden pea caused by *Pythium ultimum* is described. Infection occurs in the buds or in the axils of young leaves. Affected tissues collapse quickly and become straw-coloured to black. Usually the

upper three or five internodes are killed and new branches grow out below. Inoculations caused typical symptoms on potted pea plants in the greenhouse. High humidity was necessary for infection. Temperatures from 24° to 28° C. were most favourable for disease development.—Wisconsin Agricultural Experiment Station.

3143. Elmore, J. C.
The control of darkling ground beetles.
J. econ. Ent., 1948, **41**: 988, bibl. 3.
Darkling ground beetles, mostly *Blapstinus dilatatus*, causing serious damage in seedling pepper fields in California, were controlled by DDT dust mixtures (4% DDT fused with sulphur and 5% DDT in pyrophyllite).—U.S.D.A. Bur. Ento. Pl. Quar.

3144. Ministry of Agriculture.
Rhubarb.
Bull. Minist. Agric. Lond. **113**, 3rd edition, 1949, pp. 35, illus., 1s.
Improvements in this revised edition [for 1st edition see *H.A.*, 15: 698] include a fuller description of the commercial varieties, an account of rhubarb growing in Surrey, Middlesex, Bucks. and Kent, and some very clear drawings illustrating the vegetative propagation and crown development of rhubarb plants.

3145. Storey, I. F., and Montgomery, N.
Effect of heat pretreatment on the early forcing of seakale.
J. hort. Sci., 1948,* **24**: 214-18, bibl. 2, illus.
By preheating seakale crowns in water at 35° C. for 3 hours the yield of kale is increased by approximately one-third, or alternatively the duration of the forcing period is reduced by a like amount. Much greater increases in yield are obtained by use of new early-forcing types of seakale. [From authors' summary.]—Imp. Coll. Sci. Tech., London.

3146. Warne, L. G. G.
A further note on the effect of storage treatments on the subsequent growth and yield of shallots.
J. roy. hort. Soc., 1949, **74**: 406-7, bibl. 1.
Figures from 1947-8 experiments are given to show that the following treatments all prolonged the period of growth and increased the yield for plants derived from both medium and small sized bulbs: high temperature (25° C.) for 85 days, followed by ordinary temperature (61 days); ordinary temperature (85 days) followed by high temperature (61 days); high temperature throughout the storage period (146 days); low temperature (0°) for 85 days followed by ordinary temperature. It is stated that whilst suitable pre-planting storage treatments can be relied on to give an increased total yield their effects on daughter bulb size are as yet unpredictable. [For summaries of earlier experiments see *H.A.*, 18: 1884-5.]

3147. Warne, L. G. G.
The effects of the size of the planting material on the yield of shallots.
J. roy. hort. Soc., 1949, **74**: 407-9.
Experimental results are given showing that "the effects of decreasing the size of bulbs planted include a decrease in the number of daughter bulbs per plant, a decrease in the total yield per plant, a decrease in the incidence of bolting and an increase in the mean weight per daughter bulb (when the size of bulbs planted is less than 1·4 oz.). Further, the proportion of the total crop falling into the 'large' grade (over 1¼ inches diameter) increases regularly, as the size of the planting material decreases, and this increase outweighs the decreased total yield, so that the actual weight of large daughter bulbs is greatest when small bulbs are planted. The proportion of the crops (and the absolute weights) falling into the two smaller grades decreases as the size of the planting material is reduced." It is suggested that "(excluding the smallest size of bulb planted) there is no real advantage to be gained by planting large bulbs, unless a maximum yield of small daughter bulbs is desired, a result that can be obtained more economically by planting small bulbs closely than by planting large ones".

* Appeared August, 1949.

3148. Gram, E.
Experiments with a mosaic of shallots.
[Dutch summary 6 ll.]
Tijdschr. PlZiekt., 1949, **55**: 150-2.
Infection is readily transmitted from a diseased plant to neighbouring ones but it rapidly decreases with distance. Early removal of diseased plants and early lifting of bulbs for propagating will reduce infection.

3149. Tims, E. C.
Virus diseases of shallot in Louisiana.
Abstr. in *Phytopathology*, 1949, **39**: 500.
There are at least two virus diseases of shallot in Louisiana. One of these, aster yellows, does not spread rapidly in the field and is not serious at present. The other, yellow dwarf, causes mottling, curling, and twisting of the leaves, and stunted plants; it is transmitted by aphids and spreads rapidly in the field, causing serious losses. Growing disease-free seed stocks in isolated areas is helping to reduce the amount of yellow dwarf.

3150. Mather, K., and Haskell, G.
Breeding cold hardy sweet corn in Britain.
J. agric. Sci., 1949, **39**: 56-63.
Since about 1938 there has been increasing interest in establishing sweet corn as an additional horticultural crop in Great Britain and this paper discusses the principles of breeding sweet corn as an additional horticultural crop in this country. Cold hardiness is an important factor in this connexion. Varieties germinate differently according to when they are sown, some germinating better than others in March, and even April. Selections were first made from plants surviving March sowings and in later years, as hardiness increased, from those surviving February sowings. Selections for hardiness were made in Canada Gold, Early Golden Market sweet corn, Golden Standard Maize dent corn, and derivatives of Peruvian crossed sweet corn. All responded rapidly in their increased ability to germinate from February sowings except the Peruvian sweet derivatives. Future breeding work in Britain depends on establishing from selections cold hardy inbreds able to combine well in giving good F_1's for commercial use.—John Innes Hort. Inst.

3151. Galinat, W. C., and Everett, H. L.
A technique for testing flavor in sweet corn.
Agron. J., 1949, **41**: 443-5, bibl. 13.
A design in balanced incomplete blocks is described

for determining consumer preference for quality in varieties of sweet corn with an example of its use. In the 1948 tests by this method, C41 × C31, Seneca Chief, Red 51 × C27, and Lee KCL C27 × P39 showed a consumer preference equal to or better than that of Early Golden Cross. Emphasis is placed on the utility of the method rather than on the significance of these initial trials. [Authors' summary.]

3152. Ross, A. H., and Fisher-Webster, K. G.
Tomato seed certification [in Queensland].
Qd agric. J., 1949, **69**: 137-42, illus.

An account of the objects of the scheme and its operation, followed by notes on the origin and behaviour of the 4 varieties (Q.1, 2, 3 and 4) approved for certification during 1948-49 in the Stanthorpe district.

3153. Joubert, T. G. la G.
Hybrid vigour in tomatoes.
Fmg S. Afr., 1949, **24**: 355-6, 370, illus.

An account of tomato trials conducted at Pretoria in 1947-48 comparing the yields of the F_1 and F_2 progeny from 3 crosses with the yields of the parent varieties. The F_1 plants of each cross produced more fruit than their parents, the increase being significant in 2 crosses. F_2 yields were considerably lower than those from F_1 plants. The highest F_1 yield was from the cross Pearson × Sunrise, which gave approximately 22 lb. per plant, or 108 tons per morgen (1 m. = 2⅛ ac.). The importance of quality, size, and earliness, apart from yield, is stressed. Some of the problems involved in producing hybrid tomato seed in S. Africa are briefly discussed.

3154. Morgando, A.
Osservazioni sulla infiorescenza del pomodoro *Solanum lycopersicum* L. **(Notes on tomato inflorescences.)**
Nuovo G. bot. ital., 1948, **55**: 347-57, bibl. 3.

Differences were observed in form and development of the inflorescences of tomato plants of different tomato varieties. The fact that these differences are correlated with differences in fruit suggests that they are of practical importance.

3155. Brabec, F.
Zytologische Untersuchungen an den Burdonen *Solanum nigrum-Lycopersicum.* **(A cytological study of *Solanum nigrum-Lycopersicum* graft hybrids.)**
Planta, 1949, **37**: 57-95, bibl. 53.

The investigation was carried out on two distinct types of Winkler's graft hybrids. Meiosis was found to be similar to that of some genuine hybrids and of certain heteroploid forms.—Inst. Allg. Botanik, Hamburg.

3156. Hačatrjan, S. S.
Conjoint effect of grafting and cross-pollination of tomatoes. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 7, pp. 47-8.

In each of 5 different combinations, one variety of tomato was grafted on to another, and the scion pollinated from flowers on the rootstocks. Control plants were analogous pollinations but the plants were not grafted. The vigour (height and breadth) and the fruit weight of the plants of the resulting progeny are recorded and the data indicate that the plants of the progeny of the scion crossed with its rootstock were more vigorous and bore greater fruit than those obtained by direct crossing.

3157. Zimmerman, P. W., and Hitchcock, A. E.
Triiodobenzoic acid influences flower formation of tomatoes.
Contr. Boyce Thompson Inst., 1949, **15**: 353-61, bibl. 11, illus.

Confirmation is given of earlier work by these authors [see *H.A.*, 12: 1182] that treatment of tomato plants with 2,3,5-triiodobenzoic acid (TIB) increases the number of flowers, and causes flowers to develop from the vegetative tissue of axillary and terminal buds as well as at the normal internodal positions. The characteristic form of flower clusters and fasciation of flowers induced by TIB treatment under various conditions is further described. It was found that plants growing vigorously in summer responded to lower concentrations of TIB than slow-growing plants in winter. This suggests that the action of TIB is dependent on materials produced by the plant, and that the effect of daylength and temperature on this action needs further investigation.

3158. Randhawa, G. S., and Thompson, H. C.
Effect of application of hormones on yield of tomatoes grown in the greenhouse.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 337-44, bibl. 9.

Under winter conditions in glasshouses at Ithaca, N.Y., the " total yield of Valiant tomato plants was increased by spraying the flower clusters with β-naphthoxyacetic acid (50 p.p.m.); α-o-chlorophenoxypropionic acid (50 p.p.m.); p-chlorophenoxyacetic acid (25 p.p.m.); 2,4,5-trichlorophenoxyacetic acid (10 p.p.m.) and 2,5-dichlorobenzoic acid (100 p.p.m.). Increase in both early and total yield was obtained by the use of the first four hormones." The fruits were uniform, rich red in colour and larger than those of the untreated plants, except for an occasional misshapen fruit, one with unfilled locules or greenish jelly. The application of 2,5-dichlorobenzoic acid to the soil increased the size of tomato fruits.

3159. Howlett, F. S.
Tomato fruit set and development with particular reference to premature softening following synthetic hormone treatment.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 323-36, bibl. 1.

The author is examining the causes of the premature softening of tomato fruits following the use of hormone treatment which has led to the abandonment —possibly for the time only—of the treatment in Ohio. In doing so he has tested the effects of the different chemicals used but so far has been unable to determine the actual cause of the softening observed. He considers that there are three avenues of approach which demand further exploration. First it is necessary to discover whether or not a high rate of respiration is associated with treatment, secondly the degree to which thinness of outer wall is responsible for premature softening, and lastly—if respiration is not involved—further attempts may be necessary to find chemicals which will produce the desirable without the undesirable effects of treatment.

3160. Owen, O.
Nutrition of glasshouse tomatoes.
Farming, 1949, **3**: 264-8, bibl. 1, illus.
A popular article reviewing the nutritional requirements of the crop under glasshouse conditions in England. True trace element deficiencies are not dealt with, since they have not been encountered under commercial conditions in this country.

3161. Šmerda, V.
Vliv řezu u rajských jablíček na kvalitu semene ranost a výnos bobuli. **(The effect of pinching out shoots of tomato plants on the quality of the seed, on earliness of cropping and on yield.)** [Summaries in English and Russian.]
Sbornik československ. Akad. Zemědel., 1949, **21**: 140-5.
From the data tabulated the author concludes that the removal of a number of shoots from tomato plants gives an earlier, better ripening, and more valuable crop. The number of shoots left should depend on the number of flowers on the inflorescences. In early ripening varieties with few flowers on the inflorescences the removal of too many shoots will reduce the yield.

3162. Žurbickii, Z. I.
A new method of removing side shoots in tomato plants. (Preliminary communication.) [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 70-2.
The author refers to the action of invertase in promoting swelling and ripening of fruit. He found that its activity was not the same in leaves at different heights in tomato plants, and this led to trials of modified methods for the removal of side shoots. From data obtained he advocates a method which consists in retaining the upper shoots but removing their tips.

3163. Miller, E. V., and others.
Handling and shipping southern-grown tomato plants.
Circ. U.S. Dep. Agric. **805**, 1949, pp. 26.
Besides refrigerating cars, aeroplanes have become a means of transporting tomato plants from the South to the Northern States. One of the advantages of air transport is that orders can be given at short notice with the knowledge that on arrival conditions will be suitable for immediate planting.

3164. Mackay, J. H. E.
The foliage symptoms of acute phosphate deficiency in young tomato plants.
J. Coun. sci. industr. Res. Aust., 1948, **21**: 298-304, bibl. 9.
Symptoms of acute phosphate deficiency occurring naturally on seedling tomato plants, variety Bonny Best, growing on a brown clay loam at Canberra, Australia, are described. The symptoms could be reproduced at will on plants grown in sand culture supplied with phosphate-deficient nutrient solutions. Some of the symptoms resembled fungal spotting, but all fungi isolated from the spots were proved to be non-pathogenic. In a test of 12 tomato varieties some differences in reaction to acute phosphate deficiency were shown. When phosphate content of the nutrient solution is very low the symptoms of acute deficiency are not ameliorated by increasing the quantity of solution supplied. This is in contrast to the effect of full nutrient solution where increasing the quantity leads to an improvement in the plant. An explanation of the regularly patterned development of symptoms is suggested. [Author's summary.]

3165. Aberdeen, J. E. C.
Tomato diseases and their control [in Queensland].
Qd agric. J., 1949, **68**: 330-44; **69**: 10-25, 86-91, 146-52.
A key to assist in the identification of 22 tomato diseases is followed by a brief description of each disease and suggested measures for its control. The last part of the article deals with control measures in general.

3166. Costa, A. S.
Duas novas moléstia de vírus do tomateiro em São Paulo. **(Two new virus diseases of tomato in São Paulo.)**
Biológico, 1949, **15**: 79-81, bibl. 2, illus.
A preliminary report of the occurrence, symptoms and transmission of "yellow top" and "large calyx", two virus diseases that have recently been observed in São Paulo, Brazil, for the first time. The first somewhat resembles the tomato virus caused by a strain of curly top of sugar beet, but is not identical with this. The second probably belongs to the group of tomato big bud viruses.

3167. Hutton, E. M., and Peak, A. R.
Spotted wilt resistance in the tomato [in Australia].
J. Aust. Inst. agric. Sci., 1949, **15**: 32-6, bibl. 3.
Conditions of field infection with spotted wilt in Australia are such that Pearl Harbour and Manzana are susceptible. Porter's strain of *L. pimpinellifolium*, which is easily hybridized with commercial varieties, is field immune to this disease, but its resistance appears to be linked with its particular plant type. Work done has indicated that it may be possible to break this linkage and develop commercially acceptable types with the high resistance to spotted wilt of Porter's strain of *L. pimpinellifolium*. [Authors' summary.]

3168. Roland, G.
Enkele onderzoekingen en waarnemingen over de bronsvlekkenziekte van de tomaat en over het komkommermozaiek. **(Researches and observations on the spotted wilt disease of tomato and on cucumber mosaic.)** [French summary 6 ll.]
Tijdschr. PlZiekt., 1949, **55**: 137-41, bibl. 6, illus.
The symptoms caused by the two viruses on tomato and on dahlia are described, and an account is given of observations on the cucumber mosaic virus on spinach, beetroot, and lily. The importance of these viruses is pointed out. The dahlia is a particularly dangerous source of infection, for it is propagated vegetatively and is a symptomless carrier of cucumber mosaic.

3169. SMITH, K. M.
Tomato black-ring: a new virus disease.
Parasitology, 1946, **37**: 126-30, bibl. 10, illus., from abstr. in *Rev. appl. Ent.*, 1949, **37**: 177.

A new virus causing a disease in tomato for which the name tomato black-ring is proposed, was recovered from a tomato fruit in England in 1944. Its properties and the symptoms produced by it in tomato and other plants are described. It was transmitted by sap-inoculation to plants of 14 families. Transmission tests with *Myzus persicae* and *Macrosiphum solani* gave negative results.

3170. VAN KOOT, Y.
Enkele nieuwe gezichtspunten betreffende het virus van het tomaten-mozaiek. **(Some new aspects regarding the tomato mosaic virus.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1949, **55**: 152-66, bibl. 21, illus.

The fern-leaf symptom of tomato mosaic is favoured by low light intensity and to a less extent by excess nitrogen. Inoculations have shown that young tomato plants grown under low light intensity and at high temperature and moisture are much more susceptible than plants grown in full daylight under conditions of lower temperature and moisture. Mosaic virus is only very slightly (0·1-0·2%) seed-borne.

3171. BENNETT, C. W., AND COSTA, A. S.
The Brazilian curly top of tomato and tobacco resembling North American and Argentine curly top of sugar beet.
J. agric. Res., 1949, **78**: 675-93, bibl. 10, illus.

The rugose form of "encarquilhamento da fôlha" disease of tobacco described by Costa and Forster (*Jor. de Agron.*, 1939, 2: 295-302) and a disease of tomato described by Sauer (*Biológico*, 1946, 12: 176-8) are caused by the same virus. It was transmitted by means of the leafhopper *Agallia albidula* to a wide range of plants.—U.S. Department of Agriculture and Instituto Agronômico, State of São Paulo, Brazil.

3172. THOROLD, C. A.
The effects of certain crop rotations on the incidence of bacterial wilt disease (*Xanthomonas solanacearum*) of tomato [in Trinidad].
Trop. Agriculture, Trin., 1949, **26**: 28-32, bibl. 4.

Trials are described as a result of which it is recommended that neither tomato nor eggplant (*Solanum melongena*) nor any other solanaceous crop should immediately precede tomato. When it is necessary to grow tomatoes on land which has already carried a solanaceous crop, then cauliflower should be interposed before tomatoes.

3173. REID, W. D.
Tomato-speck of tomato.
N.Z. J. Sci. Tech., 1948, **30**, Sec. A, pp. 5-8, bibl. 7, illus.

Tomato speck is recorded in New Zealand. Diseased fruits have small (1 mm.) dark brown pustules surrounded by a narrow circular light halo. Leaf lesions are usually numerous and small (1-2 mm.) dark brown to black dry spots surrounded by a yellow zone. Infected plants are light in colour, stunted and unhealthy looking. The characters of the causal organism agree with those for *Pseudomonas punctulans* (Bryan) Dowson. [From author's summary.]

3174. HENDRIX, J. W., AND FRAZIER, W. A.
Studies on the inheritance of *Stemphylium* resistance in tomatoes.
Tech. Bull. Univ. Hawaii agric. Exp. Stat. **8**, 1949, pp. 24.

A method is described for testing segregating populations of tomato seedlings in relation to their susceptibility to grey leaf spot (*Stemphylium solani*).

3175. LINCOLN, R. E., AND CUMMINS, G. B.
Septoria blight resistance in the tomato.
Phytopathology, 1949, **39**: 647-55, bibl. 16, illus.

Resistance to *Septoria lycopersici* was found in certain collections of the species *Lycopersicon glandulosum*, *L. hirsutum*, and *L. peruvianum*. No selection in the advanced generations of the breeding work has resistance equal to that in the resistant parent.

3176. CUMMINS, G. B.
Relative effects of *Septoria lycopersici* and of possible gaseous emanations from ripe fruit on defoliation of tomato.
Phytopathology, 1949, **39**: 509-10.

The data of the experiment described showed that *Septoria lycopersici* was a major cause of defoliation in tomato, but there was no evidence that emanations from the ripe fruit had any effect on defoliation.

3177. GÄUMANN, E.
Über den Mechanismus des infektiösen Welkens. **(The mechanism of infectious wilting.)** [English summary 12 ll.]
Biol. Zbl., 1948, **67**: 22-6.

The influence of the wilting toxin of *Fusarium lycopersici* on tomato plants is discussed. Probably, it acts on the cell content in the manner of a coagulase producing two different effects: (1) The capacity of the plasm to retain water is reduced; as a result, water exudes from the interior of the cell into the transpiration stream of the cell walls, causing pathologically excessive transpiration. (2) The semi-permeability of the plasma membrane and of the vacuole walls is affected; as a result, osmotically active substances exude from the interior of the cell into the transpiration stream of the cell walls, which eliminates the osmotic condition necessary to maintain turgescence. Since these two effects have a different threshold value, it is possible to produce experimentally a pathological loss of water without wilting and pathological wilting without loss of water. [Translation of the author's German summary.]

3178. WILSON, J. D., AND RUNNELS, H. A.
Losses from tomato fruit rot can be reduced.
Food Packer, 1949, **30**: 3: 44, 46, from abstr. in *Rev. appl. Myc.*, 1949, **28**: 313.

Of the fungicides now available on the market, Zerlate has proved to be the most effective for the control of tomato anthracnose [*Colletotrichum phomoides*] at the Ohio Agricultural Experiment Station. It is best applied as a spray (2 in 100 at 150-200 gal. per acre),

but may also be used as a 10% dust at 40-50 lb. per acre. The initial treatment should be given about 30 days (never more than 35) after the first cluster blooms, and 3, or preferably 4, further applications made at 10- to 12-day intervals. An alternating schedule of Zerlate and a fixed copper or bordeaux mixture has also given excellent results, particularly when blight [*Phytophthora infestans*] is present, against which Zerlate is only moderately effective. Its action is improved by adding an adjuvant, such as Orthol-K or Du Pont spray adhesive.

3179. EDWARDS, W. H.
Tomato pests and their control [in Jamaica].
Ext. Circ. Dep. Agric. Jamaica **22,** 1948, pp. 11.
The pests [and control] discussed are:—ants, millipedes, cutworms, fruitworm, eelworm, flea beetle, hornworm, aphids, the green bug.

3180. RODRIGUEZ, J. G., AND NEISWANDER, R. B.
The effect of soil soluble salts and cultural practices on mite populations on hothouse tomatoes.
J. econ. Ent., 1949, **42**: 56-9, bibl. 5.
During this study, over 10 times as many mites were found in greenhouses where two tomato crops were grown annually as in greenhouses where the annual tomato crop was alternated with radishes, cress, or lettuce. A significant positive correlation was found to exist the first year between the specific conductivity or soluble salt content of the soil and the mite population. The soluble salt content of soils is an index of ionic concentrations and suggests approaches to certain entomological problems involving inter-relationships between soils, plants and plant-feeding forms. Type of mulch had no apparent relationship to mite occurrence. [From authors' summary.]—Ohio agric. Exp. Stat., Wooster.

3181. CLAYTON, C. N., AND ELLIS, D. E.
Soil treatments with chloropicrin, D-D, and Uramon for control of the root-knot nematode.
Phytopathology, 1949, **39**: 583-9, bibl. 6, illus.
Chloropicrin at 400 lb., D-D at 200, 400, and 600 lb., and Uramon at 2,420 and 4,840 lb. per acre were applied to sandy loam soil in March, July, and October, 1946, prior to planting tomatoes and snap beans in 1947 and cantaloupes in 1948. All October and July treatments and some of the March ones effectively reduced root-knot. In general the July and October treatments gave better control than those of March. All treatments resulted in much better growth and higher yields of tomatoes than the controls.—North Carolina Agricultural Experiment Station.

3182. WALTER, J. M., AND KELSHEIMER, E. G.
In-the-row application of soil fumigants.
Market Gr. J., 1949, **78**: 5: 12, 33, 35-7, and **78**: 6: 5, 37-9.
The advantages of applying soil fumigants for nematode control along the rows only, before each planting, are compared with those of periodic full-scale applications. In experiments made at the Florida Agricultural Experiment Station, tomato crops treated with in-the-row applications of Larvacide, DD and Soilfume 80-20 showed great increase in yield over untreated crops. The effect of various dosages was determined. The method of application, and construction of a home-made attachment for the bedding cultivating tractor are described.

3183. PEAY, W. E., AND KNOWLTON, G. F.
Occurrence of thrips within tomato fruits.
J. econ. Ent., 1948, **41**: 989-90, illus.
An account of the investigations made by the U.S.D.A. and the Utah Agricultural Experiment Station into the occurrence of *Thrips tabaci* and *Frankliniella moultoni* in cavities within canning tomatoes. 18% of the fruit examined contained such cavities, irrespective of its stage of development. Over half these were open to the blossom end, and it is thought that the others had been closed by development of the tissue. Thrips may breed within a cavity even after it has been sealed off. The authors believe that the development of cavities is a natural process, and selection of varieties with few cavities offers the best hope of control. Several applications of 3, 5, and 10% DDT, however, gave measurable control.

3184. WENE, G. P.
Control of turnip aphids.
J. econ. Ent., 1949, **42**: 73-6, bibl. 5.
Parathion, at a concentration of 1%, or gamma benzene hexachloride dusts gave excellent control of the turnip aphid, *Rhopalosiphum pseudobrassicae*, which in the Lower Rio Grande Valley is one of the major insect pests of leafy vegetables, including radishes and mustard green.—Texas Agric. Exp. Stat.

Mushrooms.

(*See also* 3287h.)

3185. COURTIEU, P., AND CHAPUIS, G.
Champignons de couche et fumier artificiel.
(Mushroom growing in artificial manure.)
C.R. Acad. Agric. Fr., 1949, **35**: 299-303.
As a result of the scarcity of stable manure the authors are investigating the possibility of preparing artificial manures for the cultivation of mushrooms. They give an account of encouraging preliminary tests in the laboratory and in mushroom beds with various chemicals, as nutrients applied to straw or reeds, for this purpose.

3186. EDWARDS, R. L.
Developing a synthetic compost. I. Choice of the source of nitrogen.
Repr. Bull. Mushroom Gr. Ass. Peterborough **17**, 1949, p. 187.
Experiments are reported from the Mushroom Research Station, Yaxley, designed to discover a source of nitrogen that is cheaper than dried blood and equally good for use in synthetic mushroom composts. [For details of composts see *M.G.A. Bull.* 15; *H.A.*, 19: 2198.] It was found that dried blood gave better results than nitro-chalk or a mixture of nitro-chalk and sulphate of ammonia. When nitro-chalk was used as a supplement to dried blood, mixtures containing 75% dried blood were better than those containing only 25%. It was also observed that increasing the proportion of potassium increased the yield when nitro-chalk was

used as the source of nitrogen, but decreased it when dried blood was used. Some observations are made on the effect of adding beet tailings and castor bean meal to the composts.

3187. LAMBERT, E. B., STEINER, G., AND DRECHSLER, C.
The "*Cephalothecium* disease" of cultivated mushrooms caused by a nematode (*Ditylenchus* sp.) evidenced by surface development of predaceous fungi.
Plant Dis. Reptr, 1949, **33**: 252-3.
The nematode is a new species related to *D. dipsaci*. Methods of control are being studied.

Potatoes.

(*See also* 2935, 3060-3064, 3072a, b, o, 3083, 3287d, g, k, l, m, 3505-3510, 3540, 3544, 3555, 3568, 3569, 3581, 3583, 3584, 3592.)

3188. NAVARRETE, R. M. A.
Un programa para el mejoramiento de la papa en Colombia. **(A programme for improvement of the potato in Colombia.)**
Rev. Fac. nac. Agron., Colombia, 1948, **8**: 375-94, bibl. 7.
The commercial varieties of potato grown in Colombia have been developed from the heterogeneous group of native varieties that are supposed to have arisen from the one species *Solanum andigenum*. Some work has already been done by the Estación Central de Papa on the establishment and testing of these varieties. In order to raise the standard of production, however, it is suggested that a comprehensive programme of improvement is needed. This should include the introduction of a seed certification scheme, and investigations into possibilities and methods of chemical fertilizing (fertilizers are now very little used), pest and disease control (especially control of *Phytophthora infestans*) and rotation practices. The need for these and other investigations is discussed. Some progress has already been made in obtaining varieties resistant to *Phytophthora* by crossing Colombian varieties with *S. demissum* and its hybrids. *S. acaule* is being used in the breeding of frost resistant varieties.

3189. ERNESTO ARANGO, U.
Sistemas de cultivo de la papa en Antioquia. **(Systems of growing potatoes in Antioquia.)**
Rev. Fac. nac. Agron Colombia, 1948, **8**: 51-8.
In the traditional system of potato growing in Antioquia the top 2-5 cm. of humus in the field are raked into heaps, most of which are burnt; the potatoes are planted in the ashes and covered with the remaining unburnt humus. This destructive practice is deplored. Two other recently introduced systems which involve the addition of organic matter to the soil are described. In one of these the field is mulched with straw or ferns at planting time. The many advantages of the mulch system, including the reduction of weeds, are pointed out. Detailed production accounts are given demonstrating the profits that may be expected from the use of each system.

3190. DE PABLO PARDO, J. C. L. A.
Economia de la producción de papas en la Argentina. **(The economics of potato production in Argentina.)**
Bol. Dir. gen. Econ. Comerc. Minist. Industr. Comerc. B. Aires **95**, 1948, pp. 69, bibl. 13.
A statistical survey of the development and present state of the potato growing industry in Argentina. Acreage and production figures are given showing how production reached a peak in the years 1940-42 and fell to a crisis level in 1947. The reasons are analysed. The relative importance of the various production areas, costs of production, the effects of certification of seed potatoes on the industry, and the significance of the import and export figures are discussed in detail.

3191. CAMPIGLIA, P.
Contribución al estudio del cultivo de la papa. **(Cultivation of the potato [in Uruguay].)**
Rev. Asoc. Ingen. agron. Montevideo, 1948, **83**: 24-32, illus.
There are 2 main problems of potato growing in Uruguay. (1) The soils are either too compact or too sandy and poor. Preliminary manurial and irrigation trials are reported which show a significant increase in dry matter and protein content of irrigated tubers over the controls. There was also a higher phosphoric acid content in irrigated than in fertilized, unirrigated tubers. (2) Seed potatoes have a dormancy period of 3 months, and in Uruguay must be ready for planting in early August. As climatic conditions make home seed production difficult, and the former source of supply from S. Argentina has become virus-infected, new sources of seed must be found. Other problems, such as the short growing season and irregularities of climate, are discussed.

3192. PORTÈRES, R.
La pomme de terre en Afrique Tropicale. **(The potato in Tropical Africa.)**
Rev. int. Bot. appl., 1947, **27**: 341-52, bibl. 22 [received 1949].
Includes a useful descriptive list of the main potato-growing areas in the highlands of east, west, and southern Africa and Madagascar, followed by an account of the ecological requirements of the different races of potato, and some brief notes on potato investigations at Amani, Tanganyika.

3193. KRANTZ, F. A., AND OTHERS.
The Waseca, Chisago and Satapa potatoes.
Amer. Potato J., 1949, **26**: 264-8, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* **2448**.
The three varieties described represent improvements in market and culinary quality and in adaptation to the principal potato growing regions of Minnesota.

3194. OLIVEIRA, A. J. DE.
Estudos de estatística agronómica, III, Eficiência relativa dos diversos delineamentos estatísticos usades na comparação de grande numero de variedades. "Lattices" e "blocos incompletos equilibrados". **(The efficacy of different kinds of block designs with special reference to *Lupinus luteus* and potato trials.)** [English summary ½ p.]
Agron. lusit., 1946, **8**: 315-40, bibl. 22.

Uniformity data were used to test the efficacy of 5 kinds of incomplete block designs. For *Lupinus luteus* the average gain in precision over randomized blocks was 138%, lattice squares being best. For potatoes the average gain was 54%, lattice squares giving 76%. [Abridgement of author's English summary.]

3195. Brust, J. H.
Doel en resultaten van de stamselectie bij pootaardappelen. (The aim and results of stock selection of seed potatoes [in the Netherlands].)
Landbouwk. Tijdschr., 1949, **61**: 642-50, illus.

Compulsory stock selection, by increasing trueness to type and freedom from those virus diseases that cannot be rogued in the field, is considered the quickest and most effective way of improving the quality of Dutch seed potato export. The practical application of the method is considered.

3196. Goidànich, G.
Fenomeni di sterilità in patate da semina di provenienza olandese. (Sterility in seed potatoes from Holland.) [English summary ½ p.]
Ann. Sper. agrar., 1949, **3**: 639-55, bibl. 18.

Three types of failure were observed in Bintje potato seed received in Italy from Holland. It is thought that the first, in which the buds developed short runners ending in a small tuber, and the second, which started with a rot of the seed piece, were probably largely due to the abnormal drought conditions of Northern Europe in the previous year. As to the cause of the third, much less frequent, failure, which was marked by long, thin sprouts giving rise to very weak plants and an absence of tubers, the author does not express an opinion.—Staz. Pat. veg. Rome.

3197. Filippov, A. S.
Micurin's teaching—a basis for potato breeding. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 6, pp. 76-82.

Experiments on potato breeding are described based on the work and teaching of Mičurin. It is claimed from the data shown that (1) Seedling varieties are modified in morphology, fruitfulness, time of ripening, and resistance to disease according to the conditions under which they are grown in their early years, particularly with regard to the manurial treatment of the soil. (2) In grafting, the scion may affect, not only such characters as the starch content of the tubers, but also the characters of the seedlings derived from vegetative hybridization. (3) Interspecific hybrids of plants that cannot be crossed normally can be obtained by " vegetative approach ". (4) In grafting, the scion variety affects the character of the progeny obtained from selfed flowers of the rootstock variety.

3198. Berkner, F.
Der Einfluss der " Bodenstimmung " auf die Ertragsbildung. **(The effect of soil pH on [potato] yields.)**
Z. PflErnähr. Düng., 1949, **45**: 194-219, bibl. 12.

About a third of the paper is devoted to a potato experiment carried out near Breslau from 1935 to 1939 on a sandy soil with a loamy subsoil. The trial was run in two main series, in which fertilizers with a physiologically acid and alkaline action respectively were applied to 5 varieties of a different genetical and ecological character. Yields in the " acid " series were 15·5% higher than those in the alkaline series. The addition of lime reduced yields in the " acid " series, owing, it is thought, to its neutralizing effect, while it increased those in the alkaline series, presumably by making more nitrogen available. The considerable increase in yield brought about in both series by applications of stable manure is ascribed merely to the nitrogen effect. Apart from yields, starch content and freedom from scab were favourably affected by " acid " fertilizers.

3199. Nobikov, F. A.
Summer planting of potatoes. [Russian.]
Sad i Ogorod (Orchard and garden), 1949, No. 5, pp. 64-8.

The advantages of summer planting of potato tubers in the southern and south-eastern parts of Russia are set out, and figures are given showing higher yields from summer-planted than from spring-planted tubers, and the plants are considered to be less liable to certain diseases. The tubers are sown towards the end of June or early in July, the date varying somewhat from one region to another. The seed tubers are taken from the preceding summer-planted crop and submitted to vernalization.

3200. Laumont, P., and Robert, J.
Résultats des essais de fragmentation et d'oeilletonnage de tubercules de pommes de terre. **(Results from trials of cut tubers and potato eyes used as seed.)**
Ann. Inst. agric. Algér., 1948, **4**: 1: 1-34, bibl. 6, illus.

The trials reported were carried out at the Station Centrale d'Essais de Semences et d'Amélioration des Plantes d'Algérie in 1944. The results showed that: (1) large tubers yield less per seed piece than medium and small tubers, but their gross yield is slightly better than that from medium tubers (without allowing for the extra amount of seed used), (2) small tubers yield more per seed than the medium-sized but their yield per hectare is much lower (15-20%), (3) the yield per seed is highest from the cut seed, especially from tubers cut in three, but the economy in seed used does not compensate for the fall in crop, the yield per ha. from medium, whole tubers being consistently higher (20%), (4) the yield from eyes, whether imported from England or prepared in Algeria, was distinctly inferior (34-37%) to that from whole tubers.

3201. Luckwill, L. C.
The suppression of sprouting in ware potatoes.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 124-9, bibl. 5.

Preliminary experiments are reported of the use of methyl-α-naphthyl acetate (MANA), methyl-α-naphthyl methyl ether (MNME) and 2-3-5-6 tetra-chloro-nitrobenzene (TCNB) to suppress sprouting of ware potatoes in wooden boxes. All proved active, their relative activity varying with the variety of potato and rate of application. TCNB is much the cheapest. Even treated and non-sprouting samples lost weight,

which suggests that treatment stimulated respiration. Further trials under clamp conditions are recommended.

3202. HEMBERG, T.
Significance of growth-inhibiting substances and auxins for the rest-period of the potato tuber.
Physiol. Plant., 1949, **2**: 24-36, bibl. 12.

In earlier papers (*Ark. Bot.*, 1946, Vol. 33B, No. 2, and *Acta Hort. Berg.*, 1947, 14: 133) the author had proved the presence of considerable quantities of growth-inhibiting substances in the peelings of dormant potatoes. In the present paper the investigation is carried a step further and it is shown (1) that there is an acid and a neutral substance, both being ether- and water-soluble, (2) that as a result of tuber treatment with ethylenechlorhydrin, which breaks the rest period, the content of these substances in the peelings is reduced. From these findings it is inferred that the growth-inhibiting substances present in the peelings are of significance in maintaining the rest period of the potato, a hypothesis which is supported by the old observation that peeling is a means of dormancy breaking. In the author's view auxins are not likely to be responsible for the rest period. He found that low concentrations (0·01-1·0 mg. per litre) of 3-indole-acetic acid do not inhibit sprout development in one-eyed potato pieces. Reasons are given for his failure to induce dormancy in potato pieces by treating them with ether extracts containing growth-inhibiting substances from potato peelings.—Stockholm University.

3203. BRADLEY, R. H., AND DEAN, L. L.
Sprout inhibition of non-dormant Chippewa potatoes.
Amer. Potato J., 1949, **26**: 279-86, bibl. 7.

While other substances were unsuccessful it was found possible to inhibit sprouting of Chippewa potato tubers which had already broken dormancy by the use of naphthaleneacetic acid and its sodium salt applied at 9 g. per bushel when the treated tubers were stored for 40 days at an average temperature of 58° F. Treatments were equally successful when application was made in talc or aqueous solution dried at 70° F. Treatment after sprouts have elongated ½ to 1 inch is probably not economically feasible owing to the very high dosage needed.

3204. ZIKA, M.
Über die Ertragssteigerung der Kartoffeln durch Heteroauxin. **(The increase in potato yields produced by heteroauxin treatment.)**
Reprinted from *J. Landw.*, undated, Vol. **89**: 1: 64-76, bibl. 27 [received 1949].

In the potato varieties tested a 24-hour treatment of the tubers in suitable solutions of heteroauxin produced a substantial increase in yield. An initial inhibition was followed by an acceleration of the rate of development. The treatment has a favourable influence on the chemical composition of the tubers and their general condition, and the size of starch grains is increased, all these effects being still noticeable the following season. In the practical application of the method the varying susceptibility to growth substance treatment of different varieties and of tubers in different developmental stages has to be considered. Climate, soil and weather conditions have also an influence on the hormone effect. [Translation of author's summary.]—The experiments were carried out at the agricultural college of Brünn, Czechoslovakia, during the years 1938-40.

3205. WOOD, D. C., AND ENNIS, W. B., Jr.
Influence of butyl 2,4,5-trichlorophenoxy-acetate upon the development of tuber abnormalities in Irish potatoes.
Agron. J., 1949, **41**: 304-8, bibl. 6, illus.

As a result of treatment with butyl 2,4,5-trichlorophenoxyacetate, epinastic leaf response and a stunting of top growth was observed in Irish Cobbler potatoes, and the tubers showed more scab injury than those of untreated plants. This scabbiness was especially noticeable in plants treated when the tubers were ½-1 in. in diameter. Histological studies showed similarities between lesions occurring on treated and untreated tubers. Isolations from all types of scab injury on treated tubers were made, and the common potato scab organism, *Streptomyces scabies*, was found to be predominant. The evidence obtained does not conflict with the theory that the scab injury occurring on treated tubers is the result of attack by this organism, which develops to an extreme degree because of physiological changes in the tuber induced by the growth regulator.—Camp Detrick, Frederick, Md.

3206. ANON.
The protection of stored seed potatoes.
World Crops, 1949, **1**: 63-5, illus.

A short account of experience with the compound Fusarex for controlling disease and sprouting in seed potatoes. It is claimed that treated potatoes can safely be used as food for man or stock.

3207. COOKE, G. W.
Placement of fertilizer for potatoes.
J. agric. Sci., 1949, **39**: 96-103.

In 29 experiments conducted in 1945, 1946 and 1947 placement of fertilizer in contact with the seed or in two bands each 2 in. away and 2 in. below the level of the seed gave average yields similar to those given by the standard practice of broadcasting after ridging but before planting. Placement in one band 2 in. below the seed was tested in 4 experiments and proved inferior to other placement methods and to broadcasting over the ridges. Broadcasting fertilizer before ridging was compared with broadcasting after ridging in 25 experiments in 1946 and 1947. Applications made after ridging were consistently superior to those made before ridging. The general relationship was that 10 cwt. per acre of fertilizer broadcast before ridging were required to produce average increases in yield equal to those given by 7 cwt. per acre broadcast after ridging. Observations on the growing crops revealed no harmful effects of fertilizer placed in contact with the seed in 1945 and 1946. In 1947, however, at several centres growth was severely checked by heavy dressings placed in contact with the seed and the final yields were below those from fertilizer placed in sidebands which caused no early check. [From author's summary.] Rothamsted.

3208. COOKE, G. W.
Fertilizer placement.
Proc. Fert. Soc., Lond., **6**, 1949, pp. 16, illus.

Includes figures from 1945-47 experiments in Britain showing the relative efficiencies of 4 methods of applying fertilizer to potatoes. On the average of all the experiments the placement methods were not appreciably better than broadcasting over the ridges.

3209. Jacob, W. C., White-Stevens, R. H., and Wessels, P. H.
The influence of irrigation on the nitrogen, phosphorus and potash requirements of different potato varieties.
Amer. Potato J., 1949, **26**: 241-55, bibl. 3, being *Pap. Dep. Veg. Crops, Cornell Univ.*, **314**.

Three years' results are reported for a 3N, 3P, 3K factorial fertilizer experiment with and without irrigation, in which 3 or 4 varieties of potato were grown each year. For Green Mountain the three years indicated a need for more than 120 lb. of nitrogen, provided the phosphorus level was kept below 160 lb. P_2O_5 and potash was at a low to medium level. Without irrigation about 2,000 lb. of a 6-4-2 seemed best, but with irrigation 2,000 lb. of a 6-4-4. Katahdin was grown for 2 years. Without irrigation about 2,000 lb. of a 6-4-6 and with irrigation 2,000 lb. of a 6-4-2 were best. Cobblers in 1948 without irrigation needed a ton of 6-4-6 and with irrigation a ton of 6-8-6. Results indicated a need for changes in the levels of the N, P, and K factors for the future conduct of this experiment. [From authors' summary.]

3210. Ferrari, T. J.
Stikstofbemesting en bodemfactoren. (Voorlopige mededeeling.) **(Nitrogen manuring and soil factors: preliminary report.)**
[English summary ½ p.]
Landbouwk. Tijdschr., 1949, **61**: 111-20, bibl. 7.

The effect of 12 different nitrogen levels was determined on experimental fields of potatoes planted on young marine clay soils containing calcium carbonate. Eight of the fields were broken grassland, 15 were old arable land. The maximum yield on broken grassland was on an average 17% higher than that on the arable. The yield of plots given no nitrogen was found to depend in part on the water level of the soil, whereas this had little influence on the maximum yields of nitrogen-manured plots. This suggests the possibility of counteracting high or low water levels by nitrogen manuring. The author concludes that the amount of nitrogen needed to obtain maximum yields depends on the structure, water level and clay content of the soil.—Agric. Exp. Stat. and Soil Science Inst. T.N.O., Groningen.

3211. Jacob, W. C., and others.
Utilization of phosphorus by potatoes.
Soil Sci., 1949, **68**: 113-20.

The experiments described were carried out in Long Island and North Carolina. The percentage of phosphorus in the potato plant derived from fertilizer increased as the rate of application was increased. As the rate of applied phosphorus was increased, the number of pounds of P_2O_5 absorbed from the fertilizer increased. The percentage of applied phosphorus utilized was very low. At the 100-lb. rate the values ranged from 4·2 to 14·5% in the four experiments.—Cornell Univ. and N. Carolina Experiment Stations.

3212. Terman, G. L.
Effect of source of potash in the fertilizer on yield and starch content of potatoes.
Amer. Potato J., 1949, **26**: 291-9, bibl. 9.

Tests in Aroostook County, Maine, in the years 1930-1944 and 1947-48 showed no difference in yield between sulphate and muriate fertilized potato plants. Sulphate resulted in higher starch content, but variety was a more important factor in this respect.

3213. Wallace, T., and Catlow, E.
Manurial experiments on vegetable crops. XIV. Effects of farmyard manure and of various fertiliser treatments on three varieties of potato—season 1948. XV. Effects of farmyard manure and other manurial treatments on potato. Season 1948.
A.R. Long Ashton agric. hort. Res. Stat. 1948, 1949, pp. 91-4 and 95-8.

Potatoes in both these trials were Majestic, Kerr's Pink and Red King. Results of different treatments are recorded.

3214. Davis, J. F., and French, G. W.
Tractor vine lifters.
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 428-33, illus.

The equipment described and illustrated was built to fit a tractor, in order to reduce damage to crops resulting from dusting and other cultural operations. The vine lifters were used successfully with onions, potatoes and several other crops.

3215. Folsom, D., Simpson, G. W., and Bonde, R.
Maine potato diseases, insects, and injuries.
Bull. Me agric. Exp. Stat. **469**, 1949, pp. 49, bibl. 15, illus.

A well-illustrated brochure of potato diseases and their control, with 4 " identification tables ".

3216. Flik, H. M.
Plantenziektenkundige bepalingen bij de export van aardappelen. **(Disease regulations relating to the export of potatoes.)**
Landbouwk. Tijdschr., 1949, **61**: 652-9.

The exacting regulations of the various potato-importing countries concerning pests and diseases, in particular wart disease, Colorado beetle, powdery scab, common scab and eelworm, and the way in which these regulations affect Dutch growers, are considered in detail.

3217. Hutton, E. M., and Oldaker, C. E. W.
Rosette, a virus disease of the potato in Tasmania.
J. Aust. Inst. agric. Sci., 1949, **15**: 25-31, bibl. 9, illus.

A condition occurring in Tasmanian and New South Wales potato crops, and locally known in Tasmania as rosette, has now been proved to be of virus origin. The disease was transmitted by grafting only with difficulty to potato, but easily to tobacco and tomato. The disease resembled most closely green dwarf, a virus disease of potato described in the U.S.A. [From authors' summary.]

3218. Köhler, E., Bode, O., and Hauschild, J.
Vergleichende Untersuchungen über die Blattroll-Resistenz von 5 mittelspäten Kartoffelsorten. **(Comparative experiments on the leaf-roll resistance of 5 medium-late potato varieties.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 81-2.

Aquila showed a very high degree of resistance to infection but low tolerance, while other varieties, such as Ostbote and Voran, proved very tolerant but at the same time highly susceptible. The breeding aim must be to increase resistance in Aquila further and to combine it with greater tolerance.—Inst. f. Virusforschung, Celle.

3219. Hochapfel, H.
Beobachtungen über das Auftreten der Pfirsichblattlaus in Nordbaden während der beiden Extremjahre 1947 und 1948 im Zusammenhang mit der Frage des Kartoffelabbaues. **(Observations on the incidence of the green peach aphid in North Baden during the two extreme years of 1947 and 1948 in relation to potato degeneration.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 72-3.

Discusses the influence of the May and June temperature on aphid multiplication, the great effectiveness of a single E605 application in the first half of June and the possibility of growing a few rows of early potatoes as a " catch " crop for the winged spring generation.

3220. Graillot, G.
Comparaison de la teneur en manganèse et en acide ascorbique des tubercules de pommes de terre normaux et fileurs. **(A comparison of the manganese and ascorbic acid content in healthy potato tubers and in tubers affected with hair sprout.)**
Ann. agron. Paris, 1949, **19**: 448-51, bibl. 8.

Potato tubers affected with hair sprout were found to contain only 72% of the ascorbic acid and 51% of the manganese present in healthy tubers. The water content of affected tubers was slightly higher (4%).

3221. Salaman, R. N.
Some notes on the history of " curl ". [Dutch summary 8 ll.]
Tijdschr. PlZiekt., 1949, **55**: 118-28, bibl. 22.

An account of the potato diseases recognized through the ages and referred to as " curl " and the present-day conception of this term.

3222. Schultz, E. S.
Pulling vs. spraying potato tops with herbicides for control of virus diseases.
Abstr. in *Phytopathology*, 1949, **39**: 504-5.

Pulling healthy potato tops on 1st August in Aroostook County, Maine, before the plants are infested with viruliferous aphids, results in healthy plants. Experiments described show also that virus diseases can be controlled by killing the tops early in August with herbicides, the tubers being harvested a few days afterwards.

3223. Milbrath, J. A., and English, W. H.
A late-breaking virus disease of potatoes.
Phytopathology, 1949, **39**: 463-9, illus.

" Late-breaking virus disease " of potatoes, so called because the symptoms usually develop late in the season, has been tuber-perpetuated for at least two generations and has been transmitted to healthy plants by grafting. —Oregon State College.

3224. Raeder, J. M.
Ring rot of potatoes. II.
Amer. Potato J., 1949, **26**: 203-7, bibl. 6.

A 10% solution of Therapogen was found to be a good substitute for boiling water for disinfecting a rotating disc seed potato cutting knife. It is a proprietary substance containing thymol, sodium brom para phenyl phenate, naphthalene, safrol, thymene and terpineol in a soap solution, alcohol 16%.—Moscow, Idaho.

3225. Sherf, A. F.
Root inoculation, a method insuring uniform rapid symptom development of bacterial ring rot of potato.
Phytopathology, 1949, **39**: 507-8.

In experiments with the ring-rot organism, *Corynebacterium sepedonicum*, the author found the root-inoculation method to be most efficient for effecting ring rot establishment and rapid uniform development of the disease in the potato plant. As few as 2 roots provided entrance for sufficient bacteria to produce disease symptoms of average severity.

3226. Hooker, W. J.
Parasitic action of *Streptomyces scabies* on roots of seedlings.
Phytopathology, 1949, **39**: 442-62, bibl. 23, illus.

In inoculation experiments the potato scab organism, *Streptomyces scabies*, infected 15 cultivated and wild species of plants.—Iowa agricultural Experiment Station.

3227. Hoyman, W. G.
The effect of zinc-containing dusts and sprays on the yield of potatoes.
Amer. Potato J., 1949, **26**: 256-63, bibl. 13.

In these trials, carried out for 3 years at 3 locations in the Red River Valley of North Dakota, *Alternaria* blight was moderate and *Phytophthora* blight was practically absent, so that the effect of the various materials applied could be evaluated irrespective of their fungicidal action. Although the plants did not show symptoms of zinc deficiency, the zinc-containing dusts and sprays were found to intensify foliage colour and to increase yields significantly. None of the copper materials used increased yields above those of the controls treated with DDT only.

3228. Wade, G. C.
An unusual potato rot.
J. Aust. Inst. agric. Sci., 1949, **15**: 42-3, bibl. 2, illus.

A description of a disease of potato tubers, variety Bismark, from the Parattah district of Tasmania. Symptoms and etiology are described. An organism, identified as *Colletotrichum atramentarium*, was isolated from rotted tubers. Control of the disease could probably be best achieved indirectly, by controlling powdery scab (the lesions of which give entry to the rot organism) and avoiding areas liable to waterlogging.

3229. Goss, R. W.
Pink rot of potatoes caused by *Phytophthora erythroseptica* Pethyb.
Res. Bull. Neb. agric. Exp. Stat. **160,** 1949, pp. 27, bibl. 32, illus.
Potato pink rot is recorded from Nebraska. Inoculation experiments showed that tuber infection could occur through the stolons, through wounds or by contact of healthy and infected tubers in storage. Disease occurred over a range of temperatures from 43° to 86° F., with the most rapid and extensive rot at 76° F. The fungus caused a wilt and tuber rot by stem and soil inoculation in the greenhouse. Warba and Pawnee varieties were the most susceptible, and least infection was on Irish Cobbler. Suggestions for control include crop rotation, roguing, separate harvesting of infected portions of fields, careful grading before shipping or storing, and avoidance of excessively high moisture in storage or in the field late in the season.

3230. Cook, H. T.
Forecasting late blight epiphytotics of potatoes and tomatoes.
J. agric. Res., 1949, **78**: 545-63, bibl. 16.
A method for forecasting the probable importance of outbreaks of blight (*Phytophthora infestans*) was used successfully in eastern Virginia in 1947. The forecasts were based on charts prepared from an analysis of the temperature and rainfall in relation to the occurrence of late blight in the 17-year period 1930-46. —Virginia Truck Experiment Station, Norfolk, Va.

3231. Hyre, R. A.
A survey of the occurrence of races of *Phytophthora infestans* in northeastern United States.
Plant Dis. Reptr, 1949, **33**: 177-9.
In the present survey cultures were obtained from the above-ground parts of potatoes and tomatoes and from potato tubers from various states, and tomato plants were inoculated with isolates of a " tomato race " and of a " potato race ". The former were the most virulent on tomato, causing definite lesions which enlarged until the plants collapsed. The potato race caused no, or only slight, lesions and there was no collapse.

3232. Wallin, J. R., and Waggoner, P. E.
The influence of weekly cumulative rainfall and temperature on potato late blight epiphytotics in Iowa.
Plant Dis. Reptr, 1949, **33**: 210-18, bibl. 6.
Under Iowa conditions a critical cumulative rainfall line does not differentiate blight from non-blight years. The meteorological factors were not effective in separating the severe from the trace blight years or the blight from the non-blight years.

3233. Bonde, R., and Schultz, E. S.
Control of late-blight tuber rot.
Bull. Me agric. Exp. Stat. **471,** 1949, pp. 16, bibl. 10, illus.
The control of tuber rot of potatoes caused by *Phytophthora infestans* is discussed, particularly with regard to killing the tops with herbicides, spraying the foliage with a strong solution of copper sulphate prior to digging, mechanical defoliation of infected tops, and the cultivation of resistant varieties.

3234. Muncie, J. H., and Morofsky, W. F.
Field tests of fungicide-insecticide combinations in Michigan for 1948.
Amer. Potato J., 1949, **26**: 287-91.
All, i.e. 22 sprays and 11 dusts tested, gave 95 to 100% control of flea beetles. Against early blight Zerlate proved exceptionally effective.

3235. Simpson, G. W., and Shands, W. A.
Progress on some important insect and disease problems of Irish potato production in Maine.
Bull. Me agric. Exp. Stat. **470,** 1949, pp. 50.
This bulletin deals chiefly with potato aphids and their role as virus vectors. The most important virus diseases of the potato in Maine are latent mosaic, common or mild mosaic, rugose mosaic, spindle tuber, and leaf-roll. Except for latent mosaic which is one of two components causing the other two mosaics, all of these virus diseases are transmitted by insects. An account is given of the primary hosts and seasonal history of the buckthorn aphid (*Aphis abbreviata* Patch), the green peach aphid (*Myzus persicae* (Sulz.)), the potato aphid (*Macrosiphum solanifolii* (Ashm.)), and the foxglove aphid (*Myzus convolvuli* (Kltb.)). Control measures are indicated.

3236. Greenwood, M. L., and Tice, J. M.
Palatability tests on potatoes grown in soil treated with the insecticides benzene hexachloride, chlordane, and chlorinated camphene.
J. agric. Res., 1949, **78**: 477-82.
With benzene hexachloride the intensity of the objectionable flavour of the cooked potatoes increased with the dosage of insecticide and was detected even at 1 lb. per acre. The results with potatoes grown in soil treated with chlordan and with chlorinated camphene were inconclusive.—School of Home Economics, University of Connecticut.

3237. von Winning, E.
Die wissenschaftlichen Arbeiten der Kartoffelkäferforschungsstation der Biologischen Zentralanstalt für Land- und Forstwirtschaft in Mühlhausen- Thür. **(The Colorado beetle research station at Mühlhausen, Thüringen.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 44.
A brief report of the research work carried out at the Colorado beetle research station, Mühlhausen, a branch of the Biol. Zentralanst. f. Land- u. Forstwirtschaft in the Soviet Zone of Germany.

3238. Fransen, J. J.
Onderzoekingen omtrent de gevoeligheid van de coloradokever voor verschillende bestrijdingsmiddelen. **(Experiments on the susceptibility of Colorado beetle to various insecticides.)**
Landbouwk. Tijdschr., 1949, **61**: 233-44, bibl. 30.
Derris powder mixtures, Gesarol, DDT and 3 formulations of HCH were tested in the laboratory for the

control of Colorado beetles; all gave satisfactory results. The effectiveness of various concentrations of these insecticides is recorded. Further investigations, including the mode of action of HCH dusts and the relative susceptibility of larvae and beetles to HCH and DDT sprays, are reported. Trials with phenothiazine, Doryxol (5% pentachloroethyl-monochlorobenzene) and E605 were inconclusive, but indicated unsatisfactory control.

3239. MITCHENER, A. V.
Chlorinated camphene, chlordan, DDT and calcium arsenate compared for control of the Colorado potato beetle.
J. econ. Ent., 1949, **42**: 152-3.
Potato foliage sprayed with chlorinated camphene appeared to be slightly greener than the foliage on any other plot. The highest tuber yields were obtained from the plots treated with 50% chlorinated camphene, chlordan 50% wettable powder and micronized 50% DDT concentrate, decreasing in the order named, but there were no significant differences among these yields. [From author's summary.]

3240. BACYLEV, E. G.
The Colorado beetle. [Russian.]
Nauka i Zizn (Science and life), 1949, No. 3, pp. 14-15.
A historical account of the Colorado beetle from its first discovery in 1823, on the eastern slopes of the Rocky Mountains, to the present time, with particular reference to its occurrence in European countries on or near the borders of Russia, and to the steps being taken in the U.S.S.R. to prevent its entry into that country.

3241. VIEL, G., GUERIN, H., AND MAS, R.
Toxicités relatives d'arséniates de cuivre purs vis-à-vis des larves de Doryphores (*Leptinotarsa decemlineata* Say). **(The relative toxicity of copper arsenates towards the Colorado beetle larvae.)**
Parasitica, 1949, **5**: 27-32, bibl. 5.
The four arsenates studied, in descending order of toxicity, were bicupric arsenate, double arsenate of copper and sodium, tetracupric arsenate and pentacupric biarsenate.—Laboratoire de Phytopharmacie de Versailles.

3242. CANNON, R. C.
Investigations in the control of the potato tuber moth, *Gnorimoschema operculella* Zell. (Lepidoptera: Gelechiidae), in North Queensland.
Qd J. agric. Sci., 1948, **5**: 107-24, bibl. 8.
Studies of the host relationships, seasonal history, and egg-laying habits of the potato tuber moth, experiments in its control with DDT and BHC foliage sprays and dusts, and observations on cultural methods of control conducted during 1946 and 1947 are described. It has been inferred that seasonal outbreaks result from introductions with " seed " stocks. Haulm infestation was effectively controlled by the application of 0·1% DDT sprays at intervals of up to 3 weeks, starting 3 weeks after germination; 2·0% DDT dusts reduced infestation, but were inferior to sprays. BHC spray had such a pronounced phytotoxic effect that its use was discontinued long before the termination of the experiment; when applied regularly, it reduced yields by about 1½ tons per acre. A 4·0% BHC dust produced less severe injury and was not more effective than the DDT dust. Tuber infestation was reduced to 7% or less by regular applications of 0·1% DDT foliage sprays, and comparable results were obtained with 2·0% DDT dust. It is considered that the application of suitable insecticides to the foliage may serve as a useful adjunct to, rather than a substitute for, late hilling in the control of tuber infestation. [From author's summary.]

3243. WOLFENBARGER, D. O.
The serpentine leaf miner and its control.
Press Bull. Fla agric. Exp. Stat. **639**, 1947, pp. 6, illus. [received 1949].
The life-cycle and control of the serpentine leaf miner *Liriomyza pusilla* (Meig.) are outlined. It proved serious among potato and many vegetable crops in Florida in 1947. Control was obtained by chlordan sprays, combined with dithane for late blight control. Chlordan may be combined with copper fungicides. One pound of the active ingredient in 100 gal. of spray is recommended.

3244. GOODEY, T.
Tuber-rot eelworm of potato and its weed hosts.
J. Helminth., 1949, **23**: 89-90, bibl. 3.
The author gives evidence to show that two common English weeds, *Sonchus arvensis* and *Mentha arvensis*, can serve as alternative host reservoirs of the tuber-rot eelworm of potato (*Ditylenchus destructor*).

3245. PETERS, B. G.
Potato root eelworm, D-D and soil sterilization. I. Methods and criteria. II. Results for 1946. III. Results for 1947.
J. Helminth., 1948, **22**: 117-27, 128-38; 1949, **23**: 73-88, bibl. 12.
The author set up a pot experiment at Rothamsted in factorial form, making use of the 3 factors:—partial steam-sterilization of soil, infection of soil with *Heterodera* cysts and injection of soil with D-D. The results of these exploratory trials, which are discussed, show the great complexity of the position when such a substance as D-D is used to kill eelworms. Thus some eelworms are killed, and potato plants make improved growth, which is due partly to the killing of the eelworms and partly to the soil amendment effect. The better root system evolved can support a larger population of eelworms, built up from the survivors. The final situation is the result of many factors, chief of which is the dosage of D-D used. The establishment of an equilibrium most favourable to the potato in the long run is a long-term problem.

3246. SEINHORST, J. W.
Stengelaaltjes en knollenaaltjes bij aardappelen. **(Stem- and tuber-eelworms of potatoes.)**
Landbouwk. Tijdschr., 1949, **61**: 638-41, bibl. 1, illus.
Two strains of eelworm found in potato tubers were distinguished by inoculation tests. The tuber symptoms are compared. One strain, referred to as stem

eelworm (possibly *Ditylenchus dipsaci*) also causes leaf symptoms, and attacks rye and oats. No potato variety has been found resistant to this strain, although certain wild species show resistance and could be used for breeding purposes. The second strain, referred to as tuber eelworm (possibly *D. destructor*), never occurs in the aerial parts of the plant, and does not attack rye or oats. Several cultivated varieties, among them Red Star, show resistance to this strain.

3247. GOFFART, H.
Gegenwartsfragen zur Bekämpfung der Kartoffelnematoden. **(The control of nematodes in potatoes.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 56-8, bibl. 8.

Discusses rotation, resistant varieties and soil fumigation.

3248. ENGEL, H.
Schadauftreten von *Orphania denticauda* in der Baar. **(Incidence of *O. denticauda* in Southern Germany.)**
NachrBl. biol. Zentralanst. Braunschweig, 1948, **1**: 36-7.

Damage to potatoes and peas, among other crops, was caused in 1948 by the locust *Orphania denticauda* in the district of Donaueschingen. Some data are given on the biology of the pest in this area.

Tobacco.

(*See also* 3287n, 3560.)

3249. SOUTHERN RHODESIA DEPARTMENT OF AGRICULTURE.
Summary of Annual Report of Chief Tobacco Officer for 1948.
Rhod. agric. J., 1949, **46**: 268-72.

Research: Trials at Trelawney have reached the stage at which the best average fertilizer mixtures containing nitrogen, phosphorus and potassium have been determined for tobacco on the local grey sand soil. Experiments on the use of compost for tobacco have given very variable results. The latest experiments have indicated that the response to compost depends mainly on the condition of the soil and the number of successive crops of tobacco that it has carried. The search for the best rotations to use in conjunction with tobacco has continued. Grass cover crops have given particularly promising results. Preliminary experiments with plant hormones to control sucker growth on tobacco plants after topping have given a fair indication that the development of suckers may be inhibited by this means. Experiments at Trelawney Tobacco Research Station to investigate the nature and severity of the damage caused by growth substances indicated that the amount of injury was related to the prevailing weather conditions. Special attention is being paid to the use of the latest soil fumigants, including D.D., against root-knot nematode. Good progress is being made in thermal efficiency experiments and the development of improved curing barns and furnaces. The main centre for tobacco research is at Trelawney but other experimental work has been carried out at Karoi, Umgusa and on the Archie Henderson Research Station. The Department of Agriculture took over from the Tobacco Research Board full responsibility for the conduct of all tobacco research in the Colony as from 1st April, 1948.

3250. SOUTHERN RHODESIA DEPARTMENT OF AGRICULTURE.
Summary of Annual Report of the Chief Botanist and Plant Pathologist for 1948.
Rhod. agric. J., 1949, **46**: 278-85.

Research: Tobacco investigations took first place, attention being devoted mainly to field control of frog eye (*Cercospora nicotianae*) and *Alternaria* spot (*A. longipes*). The tentative conclusions to be drawn from these experiments is that for field spraying under contract to be economical, fungicides of greater toxicity to fungi and of greater adhesiveness are required. It was demonstrated that the fungus *Septomyxa affinis* is the cause of leaf blotch, or scab, of young seedling leaves. A member of the staff worked on various phases of *Alternaria* disease at London University. The second species of *Alternaria* from leaf spots of tobacco, reported in 1930, was again encountered. Early in the season the Tobacco Pest Control Research Scheme was inaugurated. A programme of tobacco research has been drawn up. Investigations on the diseases of deciduous fruits were continued at Inyanga. A small sample of 6th-from-imported Up-to-Date potato seed has been grown under close observation. So far no severe mosaic or leaf roll has been detected and the yield has remained high. *Seed testing:* Imported Brassicas showed contamination by the black rot bacterium (*Xanthomonas campestris*) ranging from 5% in S. African seed to over 50% in some American samples. *Weeds:* Research into the control of tobacco witch weed (*Striga gesnerioides*) by means of trap crops continued. Some leguminous plants offer possibilities as traps. The water hyacinth is now strictly under control. Its final eradication seems to depend on the length of time its seeds can lie dormant in river beds.

3251. VAN DER VEN, L. F. J. M.
De teelt van tabak. **(Tobacco growing.)**
Meded. TuinbVoorlicht. Dienst, 1949, No. **46**, pp. 93, illus., fl. 1.50.

A detailed account of tobacco growing in Holland, and the preparation of the product for market. It begins with descriptions of the three main species of tobacco grown commercially, viz. *Nicotiana tabacum* (Virginian tobacco), *N. macrophylla* (Maryland tobacco), and *N. rustica* (Mahorka), and discusses varietal selection for particular types of tobacco. Cultural, harvesting and curing operations are described in detail and there are chapters on seed harvesting, seed testing, diseases and pests, and the fermentation of the dried leaves.

3252. VALLEAU, W. D.
Breeding low nicotine tobacco.
J. agric. Res., 1949, **78**: 171-81, bibl. 11.

Varieties of burley-like tobacco of very low nicotine content has been obtained by crossing and backcrossing low-nicotine cigar tobacco with burley. The tobacco from these varieties has been recognized by the U.S. Department of Agriculture as a sub-type of burley and has been designated Type 31-V.—Kentucky Agricultural Experiment Station.

3253. JAKOVUK, A. S., AND PSAREVA, E. N.
Guide to the appraisal of cigarette and cigar varieties of tobacco. [Russian.]
[*Publ.*] *The Mikojan State scient. Res. Inst. Tobac. Mahor. Industr. Krasnodar*, 1941, pp. 135, illus. [received 1949].
Includes descriptions and figures of leaf forms, and plates showing the habit and foliage of 43 varieties of tobacco.

3254. POLJAKOV, I. M., AND MIHAÏLOVA, P. V.
Investigations on selective fertilization in mahorka. [Russian.]
J. gen. Biol., 1949, **10**: 213-31, bibl. 13.
Using pollen mixtures (each mixture from 2 varieties) on flowers of 11 varieties of *Nicotiana rustica*, the results of which in the F_1 generation are tabulated, the author concludes that the varieties show selective fertilization.

3255. KINCAID, R. R.
Management of cigar-wrapper tobacco plant beds in Florida.
Press Bull. Fla agric. Exp. Stat. **637**, 1947, pp. 4 [received 1949].
Management of such beds, with particular reference to those treated with uramon and cyanamid, is discussed.

3256. WOLTZ, W. G., HALL, N. S., AND COLWELL, W. E.
Utilization of phosphorus by tobacco.
Soil Sci., 1949, **68**: 121-8, bibl. 4.
On tobacco trial plots it was found that increase in soil phosphorus level under comparable climatic and soil conditions resulted in an increase in total growth, an increase in total phosphorus taken up, a decrease in the percentage phosphorus in the plant from the fertilizer but no differences in the amount of fertilizer phosphorus taken up by the plant.

3257. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med forskellige Kaligødninger til Tobak 1940-1946. (**Trials of potassium fertilizers for tobacco, 1940-1946.**)
Tidsskr. Planteavl, 1949 (?), **52**: 703-4, being *Medd. Statens Forsøgsvirks. Plantekult.* **415**.
Manurial trials with tobacco, carried out at Blangsted and Spangsbjerg research stations, show that potassium improves leaf yield and composition. The application of chlorine-containing potash fertilizers, however, has been found to affect the burning quality of cigar tobacco adversely, whereas potassium sulphate had a beneficial effect. The results are tabulated in detail.

3258. SANTOS COSTA, A.
Doenças de virus do fumo, batata e tomateiro. (**Virus diseases of tobacco, potato and tomato [in Brazil].**)
Bull. Serv. Inform. Agric., Brazil, **687**, 1948, pp. 82, illus.
Symptoms and control measures, with a note on the work being done at the Instituto Agronômico at Campinas and elsewhere on the breeding of resistant varieties.

3259. REITSMA, J., SLOOF, W. C., AND THUNG, T. H.
Frog-eye and barn spot on tobacco leaves caused by *Cercospora nicotianae* Sacc. et Sydow.
Reprint from *Chron. Nat.*, 1947, **103**: 6, pp. 4, bibl. 13, illus. [received 1949].
From an examination of the spots known as frog-eye and their causal fungus on leaves of tobacco under various environmental conditions, the authors conclude that the separation of the *Cercospora* fungus into 2 species cannot be maintained. The development of either typical frog-eye spots or barn spots is determined by conditions of local humidity. These also affect certain morphological characters of the fungus previously used as distinguishing features.—General Exp. Stat. Buitenzorg.

3260. VALLEAU, W. D.
The genetics of mosaic resistance in *Nicotiana glutinosa*.
J. agric. Res., 1949, **78**: 77-9.
Nicotiana glutinosa contains the N or necrotic spotting factor but when grown at 97° F. it develops typical mosaic mottling, thus it contains not only the dominant N factor but also a dominant factor for susceptibility to mosaic.—Kentucky Agricultural Experiment Station.

3261. TOWNES, H. K.
Tobacco insect control in North Carolina.
Ext. Folder N.C. State Coll. **76**, 1949.
This folder comprises three tables showing treatments to be applied for insects in the plant bed, for those attacking newly transplanted tobacco, and those attacking older tobacco.

3262. FRÉZAL, P.
Essais de destruction des vers gris du type "Agrotis" dans les plantations de tabac. (**The control of *Agrotis* larvae in tobacco plantations.**)
Ann. Inst. agric. Algér., 1948, **4**: 6: pp. 8, illus.
An account of trials with the object of destroying owlet moth larvae by baits, powders, and sprays containing DDT or HCH.

3263. DOMINICK, C. B.
New insecticides for tobacco flea beetle control.
J. econ. Ent., 1949, **42**: 148-9, bibl. 1.
The results indicate (1) that a pre-treatment of tobacco plants in the plant bed prior to transplanting is a highly satisfactory method of controlling the flea beetle on newly set plants and (2) that the new insecticides tested are not superior to DDT in the control of the pest.—Bright Tobacco Field Station, Chatham, Va.

3264. WOODSIDE, A. M.
The tobacco stalk borer in Western Mexico.
J. econ. Ent., 1949, **42**: 63-7, bibl. 4.
The tobacco stalk borer (*Trichobaris mucorea*) is a serious pest of tobacco in the State of Nayarit, Mexico. Plants infested in the plant beds are likely to be killed, or to produce suckers, which interfere with their normal growth and the production of good quality leaf. Benzene hexachloride gave promising results in preliminary tests, while chlordan and DDT were

somewhat less effective. Insecticide treatments in the plant bed are the most promising approach to control or reduction of losses. [From author's summary.]

3265. Dominick, C. B.
Aphids on flue-cured tobacco.
J. econ. Ent., 1949, **42**: 59-62.
Aphids are an important potential pest of flue-cured tobacco. Beetles and larvae of the family Coccinellidae are important predators and under conditions of a light infestation may hold them in check. Nicotine sulphate was not effective against aphids on tobacco at a rate economical for the grower to use. Parathion, tetraethyl pyrophosphate, and benzene hexachloride all showed a high degree of efficiency in control. No plant injury was observed from the use of either of the chemicals and there was apparently no effect on the curing. Parathion dust was highly effective when the application was made without making a special effort to cover the underside of the leaves. Good control has been noted where the coverage was incomplete. It was demonstrated that 1% parathion dust has residual value against aphids on tobacco for at least 9 days after treatment. [From author's summary.]—Bright Tobacco Field Station, Chatham, Va.

3266. Kulash, W. M.
Benzene hexachloride—DDT combination dust for pest control.
J. econ. Ent., 1948, **41**: 912-13.
Aphis, probably *Myzus persicae*, on tobacco are among pests of field crops of which this combination dust gave good control.—N. C. agric. Exp. Stat., Raleigh.

Hops.

(*See also* 3577.)

3267. Bishop, L. R., and Ward, T. J.
Report on the Fermentation Industries for 1948, being reprinted from *Reports on the Progress of Allied Chemistry*, 1949, pp. 27, bibl. [no titles], 287.
On the page devoted to hops reference is made to recent papers on cultivation problems in several countries.

3268. Burgess, A. H.
English hop growing.
Agric. Bull., 1948 (?), **1**: 107-13, bibl. 11, illus., reprinted as *Rep. Wye Coll.* **5**.
An introduction to modern methods of hop culture in England, written mainly for the foreigner. The hop-growing areas, economic pests and diseases, labour problems, systems of drying and marketing, and the chief centres and lines of investigation are among the subjects dealt with. It is well illustrated by typical scenes from English hop gardens.

3269. Fröier, K.
Den svenska humleodlingen skall återupplivas. **(The revival of hop growing in Sweden.)**
Fruktodlaren, 1949, No. 4, pp. 112-14.
It is hoped that the release of the new variety Svalöf 85 will make a revival of hop growing in Sweden possible. Trials in different counties are under way. The crop should appeal particularly to the small grower.

3270. Keller, K. R.
Uniformity trial on hops, *Humulus lupulus* L., for increasing the precision of field experiments.
Agron. J., 1949, **41**: 389-92, bibl. 8.
Five hill plots are recommended, the data used representing fresh weight of crop. Incomplete block designs proved more efficient than randomized blocks for the comparison of many varieties. S.C.P.

3271. Keyworth, W. G., Hitchcock, M. M., and Wilson, D. J.
Experiments on the layering of hops. I. The establishment of a permanent layer bed. II. Layering young plants.
J. hort. Sci., 1948,* **24**: 200-5, 206-13, bibl. 8, illus.
I. Descriptions are given of two methods of establishing a permanent hop layer bed. One which has been in use for some years possesses certain practical disadvantages, and the other is a modification designed to eliminate these. Notes are given of practical experience with this latter method and the two methods are compared from the points of view of yield of cuttings and suitability for commercial application.
II. An account is given of experiments on the layering of the bines on young hop plants grown from sets and cuttings. The effects of various planting and layering distances are described and it is shown that certain of the methods enable the stock to be multiplied from 9 to 15 times per annum. Cuttings which are layered also produce plantable bedded sets and the methods should prove of value in raising varieties or strains of hop in short supply. [Authors' summaries.]—East Malling Research Station.

3272. Burgess, A. H.
The nutrition of the hop crop.
Farming, 1949, **3**: 235-9, bibl. 3, illus.
The author describes the manurial requirements of hops in England with special reference to economic practice. Examples are given of manuring schemes found effective in Kent.

3273. Keyworth, W. G., and Hewitt, E. J.
Verticillium wilt of the hop (*Humulus lupulus*). V. The influence of nutrition on the reaction of the hop plant to infection with *Verticillium albo-atrum*.
J. hort. Sci., 1948,* **24**: 219-27, bibl. 19.
A description is given of two experiments [at Long Ashton, Bristol] extending over four years on the effect of *Verticillium albo-atrum* on hops growing in sand cultures supplied with various nutrient solutions. The plants were grown under conditions involving both deficiencies and excesses of most of the major elements necessary for plant growth. In both experiments nitrogen-deficient plants showed much less severe symptoms than those grown in complete nutrient. In the first experiment only, deficiencies of phosphorus and potassium (and possibly of magnesium) produced the same effect. Other modifications in the nutrients supplied did not result in any marked alteration in the

* Appeared August, 1949.

final symptom status of the plants. [Authors' summary.] (See also *H.A.*, 18: 441, 2828; 19: 492.)

3274. Lewis, J. C., and others.
Antibacterial agents from hops.
Mim. Publ. U.S. Dep. Agric. Bur. agric. industr. Chem. **AIC-23,** 1949, pp. 15, bibl. 27.
The chemical and physical properties of lupulon and humulon are set out; their antibiotic spectra with reference to the maximum dilution producing complete inhibition of growth of certain test organisms are tabulated.

3275. Blattný, C., and Osvald, C. V.
Dřepčik chmelovy (*Psylliodes attenuata* Koch). **(The hop flea beetle.)**
Sborník československ. Akad. Zemědĕl., 1949, **21**: 173-8.
The hop flea beetle can be effectively controlled by DDT-Gesarol, derris, or derris-pyrethrum applied as dust.

3276. Blattný, C., and Osvald, C. V.
Příspěvky k prognostice škodlivých činitelü chmele: III. Sviluška chmelová (*Epitetranychus altheae* v. Hanst.). **(Forecasting factors unfavourable to hops. III. Red spider.)** [French summary ½ p.]
Ochr. Rost., 1948, **21**: 3/4: 5-13.
The severity of red spider (*Epitetranychus altheae*) infestation in hops could be forecast correctly from the meteorological data of the previous year, of the winter and of May and June. In these months the critical temperature is 12-13° C., but precipitation is an equally important factor, the mite being xerophilic. Experiments on biological control with *Stethorus punctillum* are in progress.

Rubber and other crops.

3277. Baez, C. R., Fisher, H. G., and Sívori, E. M.
Plantas caucheras: especies de la flora autoctona e introducidas y posibilidades de su explotación. **(Rubber-producing plants: native and introduced species, and the possibility of their exploitation.)**
Rev. Fac. Agron. La Plata, 1948, **26**: 183-200, illus.
An account of the work of the commission set up by the National University of La Plata, Argentina, to investigate the possibility of developing a new source of natural rubber. None of the indigenous plants so far examined has a rubber content sufficiently high to justify exploitation. *Euphorbia portulacoides*, however, showed such variation in rubber content that a study of this species, collected from various localities, is continuing. Of the plants already exploited for rubber production in other countries, the Russian dandelion (*Taraxacum kok-saghyz*) appeared most promising. Being a native of Central Asia, it can be grown in cool-temperate regions, and being a herbaceous plant it is well adapted to mechanical cultivation. An illustrated, morphological description is given, contrasting *T. kok-saghyz* with *T. officinale* and another *Taraxacum* species which may occur as a weed in the rubber-producing crop. Brief provisional suggestions for cultural treatment are given, and the possibility of improvement by selection from the very polymorphic population is discussed.

3278. Sívori, E. M.
Estudios sobre fisiologia, morfologia y selección de "*Taraxacum kok-saghyz*" Rodin. **(Studies of the physiology, morphology and selection of *Taraxacum kok-saghyz* Rodin.)**
Rev. Fac. Agron. La Plata, 1948, **26**: 201-33, bibl. 13.
The results of further studies of the rubber-producing plant, *Taraxacum kok-saghyz*, are reported from the National University of La Plata, Argentina. [For report of preliminary investigations see abstr. 3277.] This paper gives a full botanical description and an account of the reproductive mechanism. Reproduction becomes apomictic in the polyploid forms of this species, a fact that can be of great value in breeding projects. In the climate of Argentina the plant generally behaves as an annual; the best sowing time was found to be from late May to early June, and the best harvesting time December. Two generations a year, useful for breeding purposes, may be produced by vernalization. Some results and possibilities of selection are discussed. An attempt to relate certain morphological characters, such as leaf form and diameter of rosette, to the rubber content of the plant resulted in somewhat uncertain conclusions. Sand-culture fertilizer trials showed that *Taraxacum kok-saghyz* is very sensitive to mineral deficiencies, N, P and K all being important.

3279. Tiscornia, M. A.
Contenido de caucho en "*Taraxacum kok-saghyz*". Metodos de analisis. Influencias morfologicas y climaticas. **(The rubber content of *Taraxacum kok-saghyz* Methods of analysis. Effect of morphology and climate.)**
Rev. Fac. Agron. La Plata, 1948, **26**: 259-76, bibl. 9.
Various methods of analysis were tried in an attempt to find a way of determining the rubber content of *Taraxacum kok-saghyz* quickly, accurately and economically. The results obtained and relative advantages of the methods are here compared. A progressive reduction of rubber content occurred in samples left exposed to the air for more than 14 days. Analyses showed that the lower part of the roots contained more rubber than the upper, and branched roots more than unbranched. The rubber content was highest in roots harvested at the end of December of the year of sowing. —National University, La Plata, Argentina.

3280. Ramos Nuñez, G.
Perspectivas para el cultivo de la higuerilla en Colombia. **(Prospects for the cultivation of the castor-oil plant, in Colombia.)**
Agric. Trop. Colombia, 1949, **5**: 1: 14-18.
Provided that suitable, commercial varieties can be bred, the cultivation of the castor-oil plant (*Ricinus communis*) could become a valuable new industry in Colombia. Cultural requirements are noted, and an account is given of the work done at the Agricultural

Experiment Station at Palmira on the selection of varieties adapted to local conditions.

3281. Bose, S. K., and Mathur, S. C.
A new leaf-spot disease of castor *Ricinus communis* L. [in U.P., India].
Curr. Sci., 1949, **18**: 210-11, bibl. 1, illus.
The name *Phyllosticta bosensis* is given to the causative fungus, which is described.

3282. Gramenickaja, V. G.
A bacterial disease of garlic. [Russian.]
Priroda (Nature), 1949, No. 5, pp. 49-50, illus.
Although garlic produces an essential oil which has bactericidal properties, garlic bulbs brought from Middle Asia for sale in Leningrad were found to be attacked by a bacterium which produced brown stripes along the veins, and, in severe infection, reduced the scales to a shapeless mass. The morphological and cultural characters of the organism (which is not named) are briefly described.

3283. Pound, G. S.
The effect of air temperature on virus concentration and leaf morphology of mosaic-infected horseradish.
J. agric. Res., 1949, **78**: 161-70, bibl. 6, illus.
A virus causing horseradish mosaic was found in higher concentration in horseradish grown in greenhouses at 16° C. than at 28°. At high temperatures the prevailing leaf type was broadly laminate; at low temperatures the leaves were very pinnatifid and often reduced to fernleaf structures. The virus was not removed by heating infected roots or plants.—Wisconsin Agricultural Experiment Station.

3284. Darmer, G.
Neue Beiträge zur Oekologie von *Hippophae rhamnoides* L. (Sanddorn). **(The ecology of sea-buckthorn.)** [English summary 4 ll.]
Biol. Zbl., 1948, **67**: 342-61, bibl. 18.
Sea-buckthorn is an excellent source of vitamin C. The investigation was carried out on the coast of the Baltic.

3285. Savič, V. P.
The wolf lichen.
Priroda (Nature), 1948, No. 10, pp. 71-2, bibl. 10.
An account of the toxic properties, particularly with reference to its use in poisoning wolves, of the lichen *Evernia vulpina*, and of the extraction and physiological action of its active principle, vulpic acid.

3286. Anon.
Alginates for the food industry.
Food Manuf., 1949, **24**: 357-9, illus.
The possibility of developing the seaweed industry in Scotland into a major and permanent one is discussed. Research has shown that the deposits of littoral and sublittoral weed are sufficient for such an industry. The deciding factor lies in the economic harvesting of the weed, and it is probable that mechanized methods will replace crofter labour.

Noted.

3287.

a Adams, R., and Govidachari, T. R.
Senecio alkaloids: The isolation of senecionine from *Senecio cineraria* and some observations on the structure of senecionine.
J. Amer. chem. Soc., 1949, **71**: 1953-6, bibl. 8.

b Adams, R., and Govidachari, T. R.
Senecio alkaloids: The alkaloids of *Senecio douglasii, carthamoides, eremophilus, ampullaceus* and *parksii.*
J. Amer. chem. Soc., 1949, **71**: 1956-60, bibl. 4.

c Babb, M. F., and Kraus, J. E.
Home vegetable gardening in the central and high plains and mountain valleys.
Fmrs' Bull. U.S. Dep. Agric. **2000,** 1949, pp. 98, 25 cents.

d Bald, J. G.
Potato virus X: effectiveness of acquired immunity in older and younger leaves.
J. Coun. sci. industr. Res. Aust., 1948, **21**: 247-51, bibl. 6.

e Beal, J. M.
Some histological effects of carbon 14 on the leaves of certain medicinal plants.
Bot. Gaz., 1949, **110**: 600-4, bibl. 1, illus.

f Black, W. A. P.
Seasonal variation in chemical composition of some of the littoral seaweeds common to Scotland. Part II. *Fucus serratus, Fucus vesiculosus, Fucus spiralis* and *Pelvetia canaliculata.*
J. Soc. chem. Ind. Lond., 1949, **68**: 183-9, bibl. 27.
For reference to part I see *H.A.*, 19: 497h.

g Bolas, B. D.
Manganese deficiency in potatoes.
A.R. East Malling Res. Stat. for 1948, 1949, **A32,** pp. 99-100.
Refers to a letter, published in *Nature*, already abstracted [*H.A.*, 19: 52].

h Entomological Branch, N.S.W. Department of Agriculture.
Insects and other pests of mushrooms.
Agric. Gaz. N.S.W., 1949, **60**: 147-51, 168.

i Hochapfel, H.
Beobachtungen über das Auftreten der Saatenfliege (*Hylemyia platura* Meig.) an Bohnen und Gurken. **(Observations on the incidence of *H. platura* on bean and cucumber seedlings.)**
Reprinted from *Anz. Schädlingskde*, 1949, **22**: 37-8, bibl. 3.

j Manske, R. H. E.
The alkaloids of papaveraceous plants. XLII. *Dendromecon rigida* Benth.
Canad. J. Res., 1949, **27,** Sec. B, pp. 653-4, being *Contr. N.R.C.* **1973.**

k Osvald, H., and Hagberth, N. O.
The purity of potato stocks and the distribution of potato varieties in Sweden 1937-1943.
Ann. roy. agric. Coll. Sweden, 1949, **16**: 778-88, bibl. 4.

l SCHAPER, P.
Die Krautfäule-Anfälligkeit einiger deutscher Kartoffelsorten 1947/48. **(The susceptibility to blight of some German potato varieties in 1947/48.)**
Züchter, 1949, **19**: 265-71, bibl. 22.

m STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med kartoffelsorter 1943-48. **(Potato variety trials 1943-48.)**
Dansk Havebr., 1949, **8**: 156-7, being *Medd. Statens Forsøgsvirks. Plantekult.* **432.**
Trials at 5 localities on loam and sand soils.

n STEINBERG, R. A.
Symptoms of amino acid action on tobacco seedlings in aseptic culture.
J. agric. Res., 1949, **78**: 733-41.

o TREHAN, K. N., AND HALLEPPANAWAR, N. L.
Life-history, bionomics and control of safflower aphids (*Macrosiphum jaceace* Lin.) [in Bombay].
Curr. Sci., 1949, **18**: 211-12.

p WEBB, L. J.
Guide to the medicinal and poisonous plants of Queensland.
Bull. Coun. sci. industr. Res. Aust. **232**, 1948. pp. 202, bibl. numerous.

FLORICULTURE.

(*See also* 3068-3071, 3089, 3545, 3547, 3565.)

Flowers.

3288. THORSRUD, A., AND REISAETER, O.
Norske plantenavn. **(Norwegian plant names.)**
Meld. norg. LandbrHøisk., 1948, **38**: 1-276 + xiv.
A Latin-Norwegian and Norwegian-Latin dictionary of ornamental plants compiled for the Institute of Flower Growing of the Agricultural College of Norway.

3289. KLEINER, P.
Verwertung der Polyploidie in der Pflanzenzüchtung. **(Induced polyploidy, its place in plant breeding.)**
Gärtnermeister, 1949, **25**: 238-40.
Illustrations and brief descriptions of some tetraploid plants with exceptionally large flowers which breed true from seed, including *Salvia patens*, a pink delphinium, *Rudbeckia speciosa* var. *flava* and *Impatiens holstii*. Other varieties, produced by the same breeders in Switzerland, are about to be released.

3290. EHRENSBERGER, R.
Versuche zur Auslösung von Haploidie bei Blütenpflanzen. **(Induced haploidy in phanerogams.)** [English summary 12 ll.]
Biol. Zbl., 1948, **67**: 537-46, bibl. 9.
The problem was studied in *Gasteria* and *Antirrhinum majus* by treating the pollen with X-rays.

3291. TSAO, T.-H.
A study of chemotropism of pollen tubes *in vitro*.
Plant Physiol., 1949, **24**: 494-504, bibl. 21, illus.
A positive chemotropism of pollen tube to pistil was shown in 9 of the 36 species of plants (mostly ornamental flowers) studied. The active factor was not identified, but was shown to be a slowly diffusing, heat-stable, water-soluble substance of considerable molecular size and effective at very low concentrations. It is postulated that this substance may inhibit the extensibility of the wall material of the pollen tube, thus controlling the direction of growth.—Univ. of Texas.

3292. GRÉEN, S.
Grobarheten hos blomsterfrö. **(The germination capacity of flower seeds.)** [English summary 1 p.]
Medd. LantbrAkad. Trädgårdsavdel. **2**, 1949, pp. 203, bibl. 47, Kr. 7.-.
The material for this investigation are some 15,000 germination analyses, mainly carried out at the seed testing laboratory of the Weibullsholm Plant Breeding Institute. All species of ornamental plants commonly cultivated in Sweden and normally grown from seed have been investigated. The germination tests were made either on the well-known Jacobsen apparatus or in moist sand and were compared with tests in soil. Notes are given on the duration of the germination tests, temperature, light conditions, etc. As a rule, the germination analyses were carried out on fresh seed, but seeds stored for one or more years in air in cotton or paper bags at a temperature of about 16° C. were also tested on a fairly large scale. Seeds of annuals were usually found to retain their germination capacity better than those of perennials. Seeds of a great number of species must, therefore, be used in the year after harvesting. It is shown that the relationship of species belonging to a certain natural plant family can be seen also in their germination capacity and in the time needed for carrying out a germination test. Finally, an economic analysis is made of the effect of germination capacity on price of plants propagated. The demonstrable fact that low germination of seed had considerable influence on the market price of the plant emphasized the desirability of a high germination capacity for certain species and especially for those grown as pot plants in greenhouses. It is suggested that minimum germination values, proposed in this paper, be applied to seed for market. [From author's English summary.]

3293. FRANKLIN, M. T.
A quick method of demonstrating nematodes of the genus *Aphelenchoides* in leaves.
J. Helminth., 1949, **23**: 91-3.
A description of a method which has proved effective for chrysanthemum, dahlia and other leaves based on the use of a boiling solution of acid fuchsin in lactophenol.

3294. WHITEMAN, T. M.
Sodium alpha-naphthyl acetate tests on life of cut flowers.
Flor. Exch., 1949, **112**: 18: 16.

Sodium alpha-naphthyl acetate, a growth substance used to prevent fruit drop, was found to prevent shattering of paeony petals when the cut flowers were stood in a 50 p.p.m. solution. In one year the life of the cut flowers was extended from 4 to 8 days by this treatment, but in the 2 subsequent seasons, although shattering was prevented, life was not prolonged. 25 p.p.m. solutions of the hormone improved the keeping quality of lilies-of-the-valley considerably, but stronger solutions were toxic. In tests with carnation, gladiolus, *Iris reticulata*, German iris, rose and perennial pea, the treatment was ineffective.—U.S.D.A., Beltsville, Md.

3295. SMOLÁK, J.
K virosám našich Rostlin. **(Notes on some plant virus diseases in Czechoslovakia.)** [English summary 5 ll.]
Ochr. Rost. 1948, **21**: 3/4: 29-34.

The symptoms and distribution of the virus diseases of *Lepidium ruderale*, *Aesculus hippocastanum*, *Hedera helix*, *Prunus padus*, *Brassica oleracea* var. *gongylodes*, and of cereals and wild roses are described. Virus diseases in Czechoslovakia seem to be on the increase. [From author's English summary.]

3296. VON DENFFER, D.
Über die Bedeutung des Blühtermins der Wirtspflanzen von *Cuscuta gronovii* Willd. für die Blütenbildung des Schmarotzers. **(The significance of the flowering date of the hosts of *C. gronovii* for the flower formation of the parasite.)** [English summary 5 ll.]
Biol. Zbl., 1948, **67**: 175-89, bibl. 14.

On certain hosts the day-neutral parasite *Cuscuta gronovii* Willd. takes over the photoperiodical character of the stock. On *Calendula officinalis* it behaves like a long-day plant, but on *Cosmos bipinnatus*, *Cosmos sulphureus* and *Xanthium strumarium*, like a short-day plant. It is suggested that the parasite deprives its hosts not only of mineral salts and assimilation products but also of their flowering hormone. [From author's English summary.]

3297. ZIMMERMAN, P. W.
Hardiness of camellias.
Reprint from *Amer. Camellia Soc. Yearb. 1948*, pp. 106-7, 109.

A record of a camellia variety propagated with the aid of growth substances which was grown successfully in the open on the south side of a house at Yonkers, N.Y. It flowered ahead of azaleas but sustained winter injury in 1933 when −20° F. was recorded.

3298. SOVERCHIA, O., AND MICHELOTTI, I.
Il garofano di Pescia. **(Carnation growing at Pescia.)**
Ital. agric., 1949, **86**: 514-22.

A note on the very marked revival in carnation growing at Pescia since 1946. The area is now about 150 acres as against 108, the highest point reached before the war in 1939. The flowers are picked one season only and the plants are renewed from cuttings. Chrysanthemums, asters, gladioli, tuberoses, lilies and gypsophila are among other flowers grown at Pescia on a smaller scale.

3299. MINISTRY OF AGRICULTURE, LONDON.
Chrysanthemums.
Bull. Minist. Agric. Lond. **92**, 2nd edition, 1949, pp. 44, illus., 1s. 6d.

For this second edition [for first see *H.A.*, 7: 791], considerable revision of detail has been made by Mr. Wilfred Corbett of the Kent Horticultural Institute. The extensive use of semi-permanent shelters, with a consequent saving of labour in the housing of late varieties and ready protection of early varieties, is noted. The importance of selecting stock plants for freedom from spotted wilt, leafy gall and *Verticillium* wilt is emphasized, and the use of John Innes potting compost recommended in place of the previous more elaborate but vague recommendations. The 1939 classification of flower types is given, and the list of varieties revised and brought up to date. Finally a new section has been added on the control of common pests and diseases, including directions for hot water treatment against eelworm. There are several good new illustrations.

3300. POST, K.
Precision spray formation in pompoms.
Bull. N.Y. St. Flower Gr. **46**, 1949, pp. 4-8, illus.

The type of spray produced in pompom chrysanthemums is controlled mainly by daylength. Directions are given for achieving the desired effect.—Cornell University.

3301. BRIERLEY, P., AND SMITH, F. F.
Chrysanthemum stunt.
Abstr. in *Phytopathology*, 1949, **39**: 501.

This disease became generally prevalent in greenhouse chrysanthemums in U.S.A. and Canada in 1946. It is graft transmissible. Control measures are the selection of healthy plants during two successive flowering periods, control of aphids, and precautions against handling hazards.

3302. BRIERLEY, P., AND SMITH, F. F.
Transmission of chrysanthemum stunt by grafting, by leaf rubbing, and by aphids.
Flor. Exch., 1949, **112**: 15: 18-19, bibl. 6, illus.

Transmission tests show that chrysanthemum stunt, first recognized in 1945, is readily transmitted by grafting and leaf rubbing. The green chrysanthemum aphid, *Rhopalosiphum rufomaculatum*, is a vector, but results with other species of aphids were inconclusive. Symptoms were not generally expressed until the second flowering, 7-10 months after infection. This delay in symptom expression is important, as it means that the disease may be ignored by the chrysanthemum forcer who does not propagate his own stock. The propagator, however, must take exacting precautions in his handling practices and in the control of chrysanthemum aphis.—U.S.D.A., Beltsville, Md.

3303. MINISTRY OF AGRICULTURE, LONDON.
Chrysanthemum eelworm.
Advis. Leafl. Minist. Agric. Lond. **339**, 1949, pp. 4, illus.

Symptoms of attack, life history and control of chrysanthemum eelworm (*Aphelenchoides ritzema-bos*

Schwartz). Apart from hot water treatment of cuttings and stools, which is the chief means of control and is described in detail, other precautions against attack include: isolation of newly-introduced plants, rotation of crops, change of standing ground, grease-banding the stems of valuable stock, frequent spraying with nicotine, and sterilization of soil, pots, boxes, etc

3304. Hahmann, K., and Müller, H.
Das erste Auftreten der Chrysanthemengallmücke in Deutschland. (The first incidence of chrysanthemum gall midge in Germany.)
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 49-51, bibl. 21.

The incidence of chrysanthemum gall midge, *Diarthronomyia chrysanthemi*, has been reported from several nurseries in the Hamburg area. Three applications of E605 f, at a concentration of 0·02%, were found to give a 100% kill of the pupae in the leaf galls. Thus, control of the pest has been greatly simplified by the use of the new insecticide.

3305. Stearn, W. T.
A survey of literature on delphiniums from the first to the seventeenth century A.D.
Reprinted from *British Delphinium Soc. Year Book*, 1949, pp. 15, illus.

An erudite study of the old literature on *Delphinium* species, from the *Materia medica* of Dioscorides in the first century A.D. to Bauhin's *Pinax* published in 1623. Dioscorides " distinguished 3 species now placed in *Delphinium*, using names which have been taken into modern scientific nomenclature, though now given a Latin form. The early sixteenth century German ' fathers of botany ', Brunfels, Fuchs and Bock, knew only 2 species. Nowadays about 200 species are recognized, quite apart from a multitude of garden forms and hybrids." The author relates the history of man's knowledge of this genus, showing how the incurious sterility of the Middle Ages ended with the drawings from nature published in the herbals of Brunfels and Fuchs, and the renewed progress of science and the human intellect. Illustrations from the herbals are shown in 5 plates.

3306. Caddick, J. W.
Seedling growth of Ericaceous plants.
Amer. Nurserym., 1949, **91**: 4: 7-8, 42, illus.

The effects of constant artificial light and various growing media on the seedling growth of *Rhododendron* and *Pieris* species were studied in greenhouse experiments at the State College of Washington, Pullman, 5½ months after sowing, and the plants grown under constant fluorescent lighting (200-300 ft. candles at soil level) were considerably superior to those grown without supplementary light, although during the first 8 weeks of growth little difference was observable. Peat and vermiculite was found to be the best growing medium; the others were rated in the following order of decreasing value: vermiculite, sand and peat, soil, peat. In sand and vermiculite and in sand alone, growth was too poor for results to be calculated. Plants grown in peat alone suffered badly from transplanting. The nutrient solution for plants grown in the sterile media and its method of application are described.

3307. Comber, J.
The hardier mutisias.
J. roy. hort. Soc., 1949, **74**: 241-5, illus.

A description of several species of *Mutisia* that can be grown in the open in England, with notes on cultivation.

3308. Bahme, R. B.
Nicotinic acid as a growth factor for certain orchid embryos.
Science, 1949, **109**: 522-3, bibl. 10.

Experimental results are given showing that the growth of cultured orchid embryos was stimulated by the addition of nicotinic acid to the medium. Similar activation by mycorrhiza suggests one of the possible symbiotic functions of the fungal organism. Investigations under way suggest that the very low respiratory rate of orchid embryos is not increased by additions of nicotinic acid.

3309. Vacin, E. F., and Went, F. W.
Some pH changes in nutrient solutions.
Bot. Gaz., 1949, **110**: 605-13, bibl. 3.

Factors causing fluctuations in the nutrient solution (Knudson's solution C) used for the asymbiotic germination and growth of orchid seeds were studied. Exploratory experiments showed that these changes resulted from standing the solution at room temperature, autoclaving, and the germination of seeds and growth of seedlings. Even when the phosphate buffer was increased 24-fold, the buffering action was still weak in the optimal growth range of pH 4·5-5·5, indicating that phosphate buffers are unsatisfactory. Amino acids, however, were found to be excellent buffers. When the original pH value was between 3 and 6, the changes due to autoclaving were caused by the presence of iron sulphate, which should be replaced by one of the organic iron salts; when it was between 6 and 9 the changes were caused by the presence of calcium nitrate. Based on these studies a new nutrient solution is proposed.—California Institute of Technology, Pasadena.

3310. Renner, O.
Über die Modifizierbarkeit der Oenotheren.
(Induced modifications in *Oenothera* spp.)
[English summary 6 ll.]
Biol. Zbl., 1948, **67**: 52-60.

The rosettes of *Oenothera* seedlings are drawn to the soil by a shortening of the hypocotyl regulated through the cotyledons. With most species—the Californian *O. hookeri* is an exception—number, size, form and structure of the leaves of the rosettes are largely modified by length of day. Shoot formation and blossoming occur, if a certain stage of the development of the rosettes coincides with long days; if the plants germinate in the open, this will happen in the second year, following early sowing in the previous year. [From author's English summary.]

3311. Cayeux, H., and Cayeux, L.
Pivoines et digitales: hybrides nouvelles.
(Paeonies and foxgloves: new hybrids.)
Rev. hort. Paris, 1949, **121**: 37-8, illus.

Some new hybrids, resulting from crosses between the tree paeonies, *P. lutea* and *P. delavyi*, and an ornamental foxglove hybrid (*Digitalis purpurea* × *D. lutea*) are described.

3312. Ministry of Agriculture, London.
Violet root rot.
Adv. Leafl. Minist. Agric. Lond. **346,** 1949, pp. 4, illus., 1d.
The violet root rot fungus (*Helicobasidium purpureum* Pat.) is described and some of its host plants mentioned. Control measures consist of " good arable husbandry ", some details of which are given.

3313. Anon.
Influence de la date de plantation des glaieuls sur leur cycle végétatif. **(The influence of date of planting on the growth of gladiolus in Algeria.)**
Rev. hort. Algér., 1949, **53**: 233-7.
An account is given of 1948-49 trials with 5 varieties planted on 4 dates, each one month apart, the first 18th December. The main conclusion reached is that staggering the dates of planting is less important than choice of varieties (early, medium, or late) in increasing the length of the flowering season.

3314. Gould, C. J., Breakey, E. P., and Courtney, W. D.
Bulb treatment recommendations for fall, 1949.
Mim. Circ. Wash. agric. Exp. Stat. **133** (revised), 1949, pp. 4.
Notes on the treatment for pests and diseases of gladiolus, iris, lilies, narcissus, and tulips, with recommendations for the use of methyl bromide.

Bulbs and tubers.

(*See also* 2653, 3559.)

3315. Schmidt, T.
Die *Botrytis*-Fäule der Gladiolenknollen, eine für Österreich neue Krankheit. ***Botrytis* rot of gladiolus corms, a disease new in Austria.)** [English summary 6 ll.]
PflSch. Ber. Wien, 1949, 3: 97-111, bibl. 26.
The author comes to the conclusion that the *Botrytis* rot of gladiolus, recorded in Austria for the first time, is identical with the disease described in America, England, Australia and Holland and that it is caused by *B. gladiolorum*, not *B. gladioli* as has been frequently asserted.—Bundesanst. f. Pflanzenschutz, Vienna.

3316. Smith, F. F.
DDT and other synthetics for control of gladiolus thrips.
J. econ. Ent., 1948, **41**: 955-9, bibl. 14.
Field tests with dusts, sprays and an aerosol indicate that several of the new synthetic compounds show toxicity to gladiolus thrips (*Taeniothrips simplex*) equal to or exceeding that of tartar emetic-sugar sprays. Forms and rates of application are discussed. In tests with 5% DDT dust applied to stored corms, a surface application of 0·5 oz. to 1 bushel of corms in a tray shortly after harvest gave protection from thrips attack throughout the winter. Later applications gave less good protection. " DDT did not act as a fumigant against the thrips beneath the scales, and one of the dips of fumigants should be used for a more complete clean-up before planting."—U.S.D.A. Bur. Ent. Pl. Quar.

3317. Bois, E.
Iris pumila L. " Rayon d'Or ". **(A new *Iris pumila* variety.)**
Rev. hort. suisse, 1949, **22**: 309-10.
The new iris variety, Rayon d'Or, produced by a French breeder, is described.

3318. Stuart, N. W., Gould, C. J., and Emsweller, S. L.
After-harvest and precooling temperature effects on the forcing of Wedgewood iris.
Flor. Exch., 1949, **113**: 5: 11, 45.
Experimental results and detailed tables are given showing that blooming is earlier with (1) large bulbs than small ones, (2) pre-cooled bulbs than bulbs stored at 65° F., (3) bulbs pre-cooled at 50° F. than at 40° F., (4) bulbs cured at 75° or 85° F. before pre-cooling than uncured bulbs. The amount of blindness in small bulbs (8-9 cm.) was increased as the temperature of pre-cooling was lowered, but a portion of this blindness was prevented by curing the bulbs at 75° or 85° F. immediately after harvest.—W. Washington Exp. Stat., Puyallup, and U.S.D.A., Beltsville, Md.

3319. Randall, H. J.
Tall bearded irises: an appreciation of the newer varieties.
J. roy. hort. Soc., 1949, **74**: 439-44, illus.
A personal annotated selection of varieties that have been raised in England and the United States during the last 10 years. The varieties are grouped according to colour.

3320. Anon.
Ixia-rassen-vergelijkingsproef. **(Ixia variety trials.)**
Meded. Rijkstuinbcons. Z. H. Glasd., 1949, **23**: 23-4.
Forty ixia varieties were tested for suitability for glasshouse culture. The twenty-two that satisfied the requirements for *Fusarium* resistance, solidity, number of blooms, earliness, and lasting quality of the cut flowers are classified as suitable or eminently suitable.

3321. Constable, W. A.
Lilies for the amateur.
J. roy. hort. Soc., 1949, **74**: 390-5, illus.
Four lists of species and varieties are given suitable for the following conditions in Britain: woodlands; more moist situations; shrubbery- and herbaceous-borders, beds, etc.; special treatment and situations.

3322. Stuart, N. W.
Effect of storage at low temperature and high humidity on forcing performance of easter lily bulbs.
Flor. Exch., 1949, **112**: 12: 18-19, illus.
Results show that the length of time required for forcing decreases as the length of storage is increased. When the bulbs do not dry out during storage the length of forcing time is also decreased and the bud count increased. A high relative humidity can be maintained by the use of Polythene plastic sheets round the moist packing material containing the bulbs. At all times except late autumn and early winter the earliest bloom and highest bud count were obtained following storage at 31° F. in moist peat. The effects of higher and lower storage temperatures are reported.—U.S.D.A., Beltsville, Md.

3323. McWhorter, F. P., and Millsap, H. H.
Fleck and streak diseases in croft lilies.
Flor. Exch., 1949, **113**: 4: 17, illus., being *Tech. Paper Ore. agric. Exp. Stat.* **586**.
Experiments are reported showing that the sporadic occurrence of fleck in Croft lily plantings may be caused by virus infection from cucumbers, or one of the hosts of western cucumber mosaic. Primroses are shown to be a potential source of the severe form of fleck, known as streak.

3324. Kachroo, P.
A note on the vegetative propagation of *Lilium longiflorum* Wall.
Curr. Sci., 1949, **18**: 299, illus.
A case is reported in which small vegetative buds were formed on the inner and outer surfaces and edges of scale leaves, as well as in the normal axilliary position. A single scale leaf produced as many as three such buds, which made their appearance as small papillae consisting of two overlapping opposite scale leaves, which later assumed the form of normal bulbs.—East Punjab Univ., Amritsar.

3325. Gould, C. J.
Narcissus diseases in Washington.
Pop. Bull. State Coll. Washington, agric. Exp. Stats, **194**, 1949, pp. 27, illus.
This bulletin consists of (1) general control recommendations, (2) a key to the diseases described in detail (basal rot, smoulder, fire, white mould, scorch, mosaic, decline, nematode infestation) and (3) miscellaneous diseases (wet scale rot, dry scale rot, soft rot, mushroom root rot).

3326. Breakey, E. P.
Insect and mite pests of narcissus.
Reprint from *Herbertia*, 1946, **13**: 145-50 [received 1949].
Descriptions, with control measures, of the narcissus bulb fly [*Lampetia equestris* (F.)], the lesser bulb fly (*Eumerus* spp.), the bulb mite (*Rhizoglyphus hyacinthi* Bdz.) and the bulb scale mite (*Tarsonemus laticeps* Halbert).

Shrubs.

(*See also* 2676, 3537.)

3327. Wells, J. S.
Chlorosis in azaleas.
Amer. Nurserym., 1949, **91**: 5: 9-10, illus.
Chlorosis in azaleas may be due to deficiencies of iron and magnesium. The Kaempferi varieties and Kurume variety Hinodegiri seem to be especially susceptible. This can be overcome by an application of magnesium sulphate at the rate of 250 lb. per acre followed 2 weeks later by a foliage spray of a 0·5% ferrous sulphate solution.

3328. Sauvage, G.
Les ficus. (**Figs.**)
Courr. hort., 1949, **11**: 362-3, illus.
An account of ornamental species of *Ficus*, particularly *F. elastica*, *F. pandurata*, *F. bengalensis*, and *F. stipulata*. A method of aerial "marcottage" is described and figured, the result being that a new rooted plant is obtained, and the original plant shortened.

3329. Mowry, H., and Dickey, R. D.
Ornamental hedges for Florida.
Bull. Fla agric. Exp. Stat. **443**, 1948, pp. 36, illus.
Advice on the selection of species, cultivation and pruning of hedge plants is followed by an annotated, alphabetical list of species and varieties suitable for planting as hedges in Florida. This paper is a revision of *Bull.* 323 [see *H.A.*, 10: 174], and lists a great many additional species.

3330. Siminovitch, D., and Briggs, D. R.
The chemistry of the living bark of the black locust tree [*Robinia pseudo-acacia*] in relation to frost hardiness. I. Seasonal variations in protein content. II. Seasonal variations in the electrophoresis patterns of the water-soluble proteins of the bark.
Arch. Biochem., 1949, **23**: 8-17, bibl. 11, and 18-28, bibl. 5, being *Paps. Sci. J. Ser. Minn. agric. Exp. Stat.* **2427** and **2428**.
I. The correlation observed between the changes in water-soluble protein and hardiness suggest that this constituent of the bark bears some causal relationship to the mechanism of development of frost hardiness. It is also indicated that the sugars are not primary factors concerned in the mechanism.
II. During the periods of the greatest changes in hardiness and in concentration of the total protein, in fall and spring, no significant deviation occurs in the electrophoresis patterns from that which is characteristic of the winter protein. [From authors' summaries.]

3331. Toole, E. R.
Fusarium wilt of staghorn sumac.
Phytopathology, 1949, **39**: 754-9, illus.
A vascular wilt of staghorn sumac in Virginia and Connecticut, causing wilting of foliage, soon followed by death of affected plants, is caused by *Fusarium oxysporum* f. *rhois*.—U.S. Department of Agriculture, Asheville, N. Carolina.

3332. Neiswander, R. B.
The grape mealybug on *Taxus* in Ohio.
J. econ. Ent., 1949, **42**: 41-4, bibl. 4.
Under Ohio conditions, both parathion and thiocyanate have produced excellent results in the control of the grape mealybug (*Pseudococcus maritimus*) on *Taxus* when used in two applications at 10-day intervals, the first being made during the latter half of May or early in June. [From author's summary.]—Ohio Agric. Exp. Stat.

3333. Schuh, J., and Mote, D. C.
Insect pests of nursery and ornamental trees and shrubs in Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **449**, 1948, pp. 164, bibl. 52, illus.
A copiously illustrated account of insect pests written to assist the nurseryman to apply control measures intelligently. In addition to descriptions of individual pests and their control there are notes on beneficial insects (predators and parasites) and other natural control factors, insecticides and their use, equipment

for the application of dusts and sprays, how to apply dust and sprays, sanitation and crop rotation.

Noted.

3334.

a ANON.
Methods of plant propagation in the garden.
J. Dep. Agric. Éire, 1948, **45**: 113-32.
Elementary instructions, illustrated.

b GESSNER, F.
Stoffwanderungen in bestäubten Orchideenblüten. **(The metabolism of pollinated orchid flowers.)** [English summary 7 ll.]
Biol. Zbl., 1948, **67**: 457-77, bibl. 5.
Trials on *Coelogyne* and *Cymbidium*.

c HOLTTUM, R. E.
The classification of ferns.
Biol. Rev., 1949, **24**: 267-96, bibl. 13.
A discussion of present knowledge.

d NICOLINI, G.
Prospettive immediate e future della esportazione floreale Italiana. **(Present and future prospects for Italian flower exports.)**
Humus, 1949, **5**: 1: 19-24.

e RIEUX, Q.
Nouveautés suisses. **(New Swiss pelargoniums and hydrangeas.)**
Rev. romande Agric. Vitic., 1949, **22**: 279-80.

f WARDLAW, C. W.
Phyllotaxis and organogenesis in ferns.
Nature, 1949, **164**: 167-9, bibl. 9.

SUB-TROPICAL CROPS.

(*See also* 2713, 2714, 3557, 3585.)

Avocado.

3335. CARRA, M., AND GUEIT, M.
L'avocatier. **(The avocado.)**
Doc. Rens. agric., Insp. Gén. et Dir. de l'Agric., Algér. [out of series], 1949, pp. 59, bibl. 18, illus.
A treatise on the avocado crop, with particular reference to its cultivation in North Africa. The subject is dealt with under: botanical characteristics, floral biology, eating and dietetic qualities, history of cultivation, temperature requirements, soils, multiplication, grafting, planting, manuring, pruning, harvesting, varieties, pests and diseases. A suggested research programme is outlined.

3336. GUYOT, H.
L'avocatier dans les territoires français d'outre-mer. **(The avocado in French overseas territories.)**
Fruits d'outre mer, 1949, **4**: 141-5, illus.
Data on avocado culture in French North Africa, French West and Equatorial Africa, Martinique and Guadeloupe.

3337. CARRA, M., AND GUEIT, M.
La biologie floral de l'avocatier en Algérie. **(Floral biology of the avocado in Algeria.)**
Ann. Inst. agric. Algér., 1948, **4**: 5, pp. 7, illus.
The main findings from this study are: (1) that the floral biology of the avocado, *Persea americana* and *P. americana drymifolia*, does not follow strict rules, each flower has a separate evolution; (2) this manner of floral evolution does not cause bad pollination; (3) dichogamy, which is found in American orchards, was not observed.

3338. RUEHLE, G. D.
Fertilizing avocados on Rockdale limestone soils [Florida].
Press Bull. Fla agric. Exp. Stat. **635**, 1947, pp. 4, bibl. 1 [received 1949].
Recommendations are made covering the first to the fifth and subsequent years. These recommendations include the use of nutrient sprays containing copper, zinc, and manganese.

3339. ZENTMYER, G. A.
Verticillium wilt of avocado.
Phytopathology, 1949, **39**: 677-82.
A disease of avocado trees in California, with sudden wilting and collapse of the leaves, is caused by *Verticillium albo-atrum*.—University of California, Citrus Experiment Station.

3340. MORENO, E. M.
Le *Copturomimus perseae* Hustache, nouvelle espèce entomologique et parasite de l'avocatier colombien. **(*C. perseae*, a new pest of avocado in Colombia.)**
Fruits d'outre mer, 1949, **4**: 10-15, 120-4, 171-6, bibl. 15, illus.
The article is a translation of extracts from the author's original paper which appeared in *Rev. Fac. nac. Agron. Medellin*, 1947, **7**: 167-247. It describes a newly discovered pest of avocado, *Copturomimus perseae* n.sp., which has already caused considerable damage in Colombia. Extensive die-back of branches results from holes bored in stem, branches and shoots through which the sap exudes, giving the trees a characteristically blackish appearance. Control measures suggested are (1) monthly applications of DDT during the dry and hot season; (2) peeling or cutting out affected parts followed by burning the bark and wood.

Citrus.

(*See also* 2665, 3550, 3571.)

3341. PRESTIANNI, N.
Il punto sull'agrumicoltura. **(Thoughts on citrus culture in Italy.)**
Ital. agric., 1949, **86**: 475-84.
An article [like so many other recent Italian articles] comparing achievements in other lands with achievements, possibilities and necessities in Italy. There the application of science and the funds to provide it are to-day's urgent need. The author is optimistic.

3342. CHEVALIER, A.
Sur un Citrus d'apparence spontanée vivant dans la forêt dense de l'Ouest africain. **(A wild citrus of the west African forest.)**
Rev. int. Bot. appl., 1949, **29**: 355-66, bibl. 9+, illus.
A long description is given of an African sour orange, *Citrus aurantium* s.sp. *africana* Chev., and shorter descriptions of two other subspecies of *C. aurantium*, i.e. *gallica* and *paradisi*. All are said to be quite distinct from the sour oranges (bigaradiers) commonly grown for their essential oil. [Such subspecies might be of considerable interest as possible substitute rootstocks for the ordinary sour orange in areas infected with tristeza, or quick decline, of citrus.—ED.]

3343. ANON.
Citrus growing in Australia.
Calif. Citrogr., 1949, **34**: 368, reprinted from *Texas Farming and Citriculture*.
A short description of the conditions under which the industry is carried on around Gosford, N.S.W.

3344. GALANG, F. G.
Rutaceous fruits in the Philippines.
Philipp. J. Agric., 1947, **13**: 127-67 [received 1949].
Some notes from observation trials with numerous introduced varieties of citrus. Also some information on the kalamondin, kalamansi, or limoncito (*C. microcarpa*), a native of the Philippines.

3345. SIMONNEAU, P., AND MAURI, N.
Observations sur la floraison du Clémentinier en 1945 et 1946. **(Observations of flowering in the clementine during 1945-46.)**
Ann. Inst. agric. Algér., 1947, **3**: 179-99 [published 1948, received 1949].
Refers to the Monréal and the common clementine in Algeria.

3346. SIMONNEAU, P.
Clémentine Monréal. Recherche d'un type sans pépin. **(Monréal clementine, examination of a "seedless" type.)**
Ann. Inst. agric. Algér., 1947, **3**: 201-2 [published 1948, received 1949].
Of 52 fruits examined from one bunch, 75% were seedless. 21% one-seeded and about 4% two-seeded.

3347. HAAS, A. R. C.
Orange fruiting in relation to the blossom opening period.
Plant Physiol., 1949, **24**: 481-93, bibl. 5, illus.
In S. California orange blossoms open successively over a period of 2 months. In order that thinning may be carried out intelligently, it is important to know the period of opening that results in the best set of fruit. For this purpose freshly opened blossoms on Washington Navel and Valencia orange trees were tagged at various dates during the blossoming season. Temperature records were kept. It was found that the first-open blossoms produced least fruit, the production increasing progressively as the season advanced. This is attributed to the reduced competition for nutrition from the young leaves, and to the improvement in weather conditions as the season advanced.—Citrus Exp. Stat., Riverside.

3348. ADRIANCE, G. W., AND HAMPTON, H. E.
Root distribution in citrus, as influenced by environment.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 103-5, bibl. 6.
Observations were made in the Lower Rio Grande Valley of Texas on the root systems of 10-15-year-old Marsh grapefruit worked on sour orange in soils described as heavy, compact; compact, grey, sandy; deep of good texture; and in a cultivated and bordered orchard as contrasted with an uncultivated orchard, the vertical and lateral distribution both being determined. They are set out here and discussed.

3349. GONZÁLEZ-SICILIA, E.
Estudio de los pigmentos carotenoides en los frutos de los agrios. **(A study of the carotinoid pigments in citrus fruits.)**
Bol. Inst. Invest. Agron. Madrid, 1949, **9**: 20: 235-58, bibl. 5.
An analytical study of carotinoid content of the peel, juice and pulp of a number of varieties of mandarin, orange, grapefruit and lemon. The results are tabulated.

3350. CROUS, P. A.
Bud selection and nucellar seedling lines. Rootstocks in American citriculture.
Citrus Gr., 1949, No. **182**, pp. 5-6, 12; No. **183**, pp. 7-8, 12; No. **187**, p. 9.
Abstracts from the author's report on the American citrus industry.

3351. RUTHERFORD, D. M.
A major operation [in citrus grafting].
Calif. Citrogr., 1949, **34**: 333, illus.
A note on an attempt to graft 125 80-year-old seedling orange trees in California. Each tree was first sawn off waist high leaving a stump 14 to 20 in. in diameter, around the top of which numerous scions from a selected parent tree were inserted under the bark and kept in place by a wire around the stump about ½ in. from the top. This wire was tightened with wedges. The stump top, with the area around each scion, was then covered with grafting compound and the whole shaded with paper and burlap to prevent sun damage. Leaf and sucker growth in the stumps will be encouraged. It is not yet known whether these large stumps will heal and form bark, the whole operation being in the nature of an experiment.

3352. SMITH, P. F., REUTHER, W., AND SPECHT, A. W.
The influence of rootstock on the mineral composition of Valencia orange leaves.
Plant Physiol., 1949, **24**: 455-61, bibl. 13.
Leaves from Valencia orange trees on 6 different rootstocks were analysed for total ash content and 11 nutrient elements. The results show that the rootstock is of considerable importance in determining the pattern of mineral composition of scion leaves. Highly significant differences in the percentages of nitrogen, potassium, calcium, magnesium, manganese, copper, boron, zinc and iron attributable to rootstock influence were found. The sodium content of the leaves was not significantly affected. The concentrations of minor elements varied more widely than those of the

major elements. The absolute amount of the total N per leaf appeared to be correlated with tree size. None of the other elements determined showed such a consistent trend. This suggests that there is a differential ability of the stock to supply N to the scions, and this in turn contributes towards producing the different growth rates observed.—Bureau of Plant Industry, U.S.D.A., Beltsville.

3353. VAN DER MERWE, A. J.
Nitrogen nutrition of citrus trees in the nitrate and the ammonium form. I. Quantity and forms of inorganic nitrogen. II. The effect of inorganic forms of nitrogen on yield and quality of citrus fruit. III. Effects of nitrate and ammonium nitrogen on the growth of citrus trees—sand cultures.
Fmg S. Afr., 1949, **24**: 243-5, 331-4, 361-5, illus.

A summary of results from a controlled experiment with 3 orange varieties, Navel, Bailidge Early (Mid-season) and Valencia, all budded on rough lemon rootstocks, the orchard of 88 trees being planted in 1938 and the treatments begun in 1939. A full account of the experiment is promised in a forthcoming bulletin.
I. Results from experiments comparing two forms of nitrogen are quoted, followed by a recommendation that for best results judgment be used in giving fertilizers and irrigations. Inorganic forms of nitrogen should be applied in small quantities but more frequently than organic. Sandy soils should be irrigated more frequently but with less water at each application than heavier soils. Where ammonium sulphate was applied, the conversion of ammonium to nitrate nitrogen started actively during October only. The trees were, therefore, able to absorb appreciable amounts of nitrate nitrogen only after October. There is the possibility that the same reasoning could be applied to the organic forms of nitrogen, for example kraal manure.
II. " The effect of the two forms of nitrogen (ammonium and nitrate . . .) together with phosphate upon yield and quality of fruit can be summed up as follows: When trees are fertilized with nitrate nitrogen and adequate phosphate, the yield is high, and the fruit have thinner rinds, less raggy pulp, and lower acid content. . . . Where the trees are fertilized with ammonium sulphate and adequate phosphate the results show an acid soil and retarded nitrification. These detrimental processes, despite the addition of phosphate, lead eventually to absorption of ammonium nitrogen by the trees with the ultimate result that low crops, thicker rinds, raggy pulp and acid fruits are produced." These studies indicate that it is more beneficial to apply N to citrus in the nitrate form, preferably as calcium nitrate.
III. Deals with sand culture experiments designed to compare the effects of the 2 forms of N on the general growth and appearance of young citrus trees growing in drums of 12 × 18 in. Results are recorded and discussed. Under the conditions of the experiment, N in the ammonium form had an adverse influence on the growth and appearance of young citrus trees, but it was possible to restore normal growth by changing it to the nitrate form. The two more striking effects of the ammonium nitrogen were (1) leaf symptoms, resembling those ascribed to certain mineral deficiencies, and (2) a severe deterioration of the root system, accompanied by the failure of fine roots to develop. It is concluded as a result of the above experiments that if the growth of citrus trees is to be maintained, or improved, present manurial practices must be changed, particularly in the conditions that prevail at Rustenburg. The farmers depend almost entirely on ammonium sulphate for the N supply. The need for a source of nitrate N, preferably calcium nitrate, has become very real.

3354. JONES, W. W., AND PARKER, E. R.
Effects of nitrogen, phosphorus, and potassium fertilizers and of organic materials on the composition of Washington Navel orange juice.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 91-102, bibl. 19.

In two Californian orchards of Washington Navel oranges on sweet orange rootstocks the following results were noted: Application of nitrogenous, phosphatic and potash fertilizers increased the concentration of each of these respectively in the juice. The growing of winter cover crops reduced the concentration of both nitrogen and potassium in the juice. Cover crops caused a slight increase of calcium in the juice. The use of manure as the only fertilizer greatly increased the potassium, and reduced the nitrogen and calcium concentrations, in the juice. The following positive correlations were found to be significant: (*a*) the concentration of potassium in the juice with percentage of total acid in the juice, and (*b*) the concentration of phosphorus with the percentage of juice of the whole fruit. The following significant negative correlations were found: (*a*) the concentration of phosphorus in the juice with percentage of acid in the juice, and (*b*) the ascorbic acid content with the concentration of phosphorus in the juice. [From authors' summary.]

3355. REUTHER, W., AND OTHERS.
Phosphate fertilizer trials with oranges in Florida. I. Effects on yield, growth, and leaf and soil composition.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 71-84, bibl. 28.
SMITH, P. F., REUTHER, W., AND GARDNER, F. E.
II. Effect on some fruit qualities.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 85-90, bibl. 16.

In the first paper two field experiments are reported from Florida, one on a mature Valencia orange grove for 6 years, and the other on a young Pineapple orange grove for 4 years. The data indicate that no beneficial use was made of superphosphate applied in either case. There are indications that heavy phosphate applications were associated with increased accumulation of phosphate, zinc and manganese and decreased copper in the leaves. Treatment did not significantly affect N, K, Na, Bo or Fe content in the leaf. There was a suggestion that heavy phosphate applications decreased Mg and increased Ca in the foliage. In the second paper data refer to effect on yield of the same groves. The changes accompanying increased phosphatic manuring did not benefit fruit quality. The lowering of total soluble solids, citric acid and ascorbic acid

tended to be bad for the internal fruit quality of Valencias.

3356. Haas, A. R. C.
Potassium in citrus trees.*
Plant Physiol., 1949, **24**: 395-415, bibl. 25, illus.

This investigation is largely concerned with the production and identification of K-deficiency and K-excess symptoms in citrus trees grown in sand culture, for the purpose of establishing a ready means of orchard diagnosis. The effects of varying K concentrations on the growth and composition of leaves, flowers and fruit of Valencia orange and Eureka lemon were studied. Symptoms produced in artificial culture led the author to identify a characteristic gum-spotting of citrus leaves as a reliable diagnostic feature of deficiency. This gumming occurs only under orchard conditions and has not been produced artificially. K deficiency was found to be associated with small fruit size and poor set, probably as the result of excessive leaf-fall at flowering time. The number of flowers, too, decreased markedly with decrease in K level of the culture solution. High K levels (50-700 p.p.m.) produced no injurious effects, provided that the nutrient solution was well balanced. The effect of fertilizer applications, in particular of N, to the content of K and other constituents in leaves, flowers and fruit was also studied.

3357. Penman, F.
Boron poisoning in citrus.
J. Dep. Agric. Vict., 1949, **47**: 181-9, bibl. 21, illus., and *Citrus News*, 1949, **25**: 7.

Boron poisoning symptoms have been identified in citrus in irrigated areas of northern Victoria. Characteristic symptoms are invariably present if boron content of dry matter of citrus leaves exceeds 500 p.p.m. The symptoms include the development of rather irregular yellowish areas between the veins, tip burn, and (under Victorian conditions) the presence on the underside of leaves of small pustule-like elevations which are at first translucent and colourless, but later may become light-brown. Heavy leaf fall, particularly during early spring before main growth starts, occurs as a result of boron accumulation. Affected trees have reduced yields. Boron native to the soils is considered the chief source of the trouble. Susceptibilities of various types of citrus under Victorian conditions are described and prospects of control discussed. Water-soluble boron in soils of the Victorian areas where boron injury has been identified varies up to 16 or more p.p.m.

3358. Acerete, A.
El riego de los heurtos. **(Irrigation of [citrus] orchards.)**
Publ. Estac. exp. Aula Dei, Zaragoza, 1949, pp. 103, bibl. 53, 35 pesetas.

The basic principles and various methods of irrigation are presented to the Spanish citrus grower in a clear and discriminating manner. The first chapters contain an account of the water relations of soil and plants, and an explanation of such necessary terms as "field capacity", "wilting coefficient" and "moisture equivalent". Then follows a detailed description of the systems of irrigation practised in various parts of the world—the basin, furrow, zig-zag furrow, contour furrow, overhead sprinkling and porous hose systems—and a comparison of their advantages, applications and costs. Growers in the plains of Valencia, the citrus district of Spain, commonly practise the traditional basin method. Where land is level, labour cheap and water in good supply, this is shown to be a very satisfactory system, but the advantages of the overhead sprinkling system for sloping ground are pointed out. In spite of the high initial cost of installation this might prove more economical than a method involving levelling and terracing. Finally, problems of when and how much to irrigate, the effects of saline water and water with a high boron content, and the results of over-irrigation are discussed. Although published this year, the book was written in 1942, with the result that recent work is not covered and the bibliography not quite up to date.

* See also *H.A.*, 19: 2393.

3359. Huberty, M. R., and Pearson, H. E.
Irrigation of citrus orchards with waters of different chemical characteristics—a progress report.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 62-70, bibl. 8.

This is a progress report covering 6 years' observations of the effect of waters of different chemical characteristics, mainly Colorado river water, on mature orchards, the soil of which is a medium-textured, semi-mature, secondary soil derived from igneous rock high in quartz. The B horizon is quite well developed. Although tree vigour and fruit yield have been but little affected, the physical and chemical characteristics are beginning to show measurable changes. These are noted.

3360. Teague, C. P.
Improve [citrus] fruit sizes with better water distribution.
Calif. Citrogr., 1949, **34**: 398-400.

Some observations based on recent orchard surveys undertaken in California to determine the relationship of fruit size to irrigation management, the most important controllable factor for improving size in the hands of the grower. Figures are given showing the difference in diameter of fruits from trees at the beginning and end of a 22-tree (440 ft.) irrigation run, in this case $\frac{1}{2}$ in. Three methods are suggested for improving penetration of water on the lower part of irrigation runs.

3361. Anon.
Windbreak management.
Calif. Citrogr., 1949, **34**: 369-71.

A note on the use of windbreaks for citrus orchards in Orange County. The eucalyptus (blue gum) is most commonly used, with various cypresses as fillers. Proper pruning, to prevent shading adjacent citrus, and root cutting every 2 or 3 years, are recommended. A root-cutting machine is illustrated. The necessity for applying fertilizers and irrigation water is stressed.

3362. Simonneau, P., and Mauri, N.
Observations sur l'action du siroco dans les orangeraies. **(Observations on the effect of the sirocco in orange orchards.)**
Ann. Inst. agric. Algér., 1948, **3**: 203-8.

These observations were made during 1945 in two

irrigated plantations of mature clementines in the Perrégaux area of Algeria.

3363. McGillivray, K. D.
Mechanical measures for control of soil erosion on central coast citrus orchards.
Agric. Gaz. N.S.W., 1949, **60**: 125-9, 189-92, 197.

The first part of this article discusses the over-all planning of the property for preventing soil erosion, and the concluding part gives details of the design and construction of waterways.

3364. Miller, E. V., Winston, J. R., and Cubbedge, R. H.
A physiological study of post-harvest abcission in pineapple oranges.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 158-62, bibl. 4.

Oranges which had lost their stem buttons showed very much more green mould than fruits with stems attached. Despite this, fruit without buttons stored best owing to the much greater prevalence of stem-end decay in the fruit thus stored. The effect of oil spraying on post-harvest abscission is discussed.

3365. Pittman, H. A. J.
Principal diseases of lemons in Victoria and their control.
J. Dep. Agric. Vict., 1949, **47**: 117-22.

The principal diseases of lemons in Victoria starting with those that affect the root system and base of the tree, and proceeding upwards are: armillaria root rot, collar rot, brown rot, shell bark, anthracnose, citrus pit, and septoria spot. These are described with summaries of control measures.

3366. Sempio, C.
Su una alterazione parassitaria del limone in serra (nota preventiva). (**A parasitic disorder of hothouse lemon trees (a preliminary note).**)
Ann. Fac. agrar. Perugia, 1946, **4**, pp. 7, from abstr. in *Rev. appl. Mycol.*, 1949, **28**: 285.

A disease causing desiccation and shedding of the mature leaves and often the year-old branches of hothouse lemons has been known in parts of Umbria and the Marches for some years. Young fruits suffer more severely than older ones; the smallest gradually turn brown and become mummified. The older fruits appear dark chestnut brown and become hardened. A fungus isolation from diseased fruits and branches yielded positive results in inoculations.

3367. Knorr, L. C.
A gall of Tahiti lime and other citrus species caused by dodder.
Phytopathology, 1949, **39**: 616-20, bibl. 9, illus.

Galls found on Tahiti lime (*Citrus aurantifolia*) in Winter Haven, Florida, in 1948 and attributed to *Cuscuta americana*, caused stunting of twigs. Control involves pruning out infected wood or cutting back the trees and cultivating the ground beneath the trees so as to preclude reinfection by next spring's seedlings.—Citrus Experiment Station, University of Florida.

3368. Bennett, C. W., and Costa, A. S.
Tristeza disease of citrus.
J. agric. Res., 1949, **78**: 207-37, bibl. 35, illus.

Tristeza of citrus, first observed in Argentina in 1930 or 1931 and in Brazil about 1937, now occurs in most of the commercial citrus districts of Argentina, Brazil, and Uruguay. The same or similar disorders, all characterized by serious damage to varieties of sweet orange on sour orange rootstock, have been observed in South Africa, Java, southern California, and Australia. The authors record the transmission of the disease to sweet orange on sour orange rootstock growing under field and greenhouse conditions by the insertion of buds from diseased trees. The vector of the causal virus was found to be the oriental citrus aphid, *Aphis citricidus*. In tests involving more than 1,400 plants the disease was not transmitted through the seeds of sweet or sour orange. Tristeza symptoms have not been observed on any citrus variety on its own roots. The scion-stock combinations which show the disease are sweet orange, Marsh seedless grapefruit, Mexeriqueira tangerine, mandarin, Thornton tangelo, and Galacian lemon on sour orange rootstock, and probably sweet orange on grapefruit rootstock. Inoculation of small plants with the aphis vector indicates that the following scion-stock combinations may be susceptible to injury under greenhouse conditions: Sweet orange on Viçosa grapefruit and Doce and Melancia shaddocks; and Viçosa grapefruit, Doce shaddock, Cleopatra mandarin, Satsumelo 10-V-3, and Sunshine tangelo on sour orange rootstock. The virus was transmitted to small, sweet orange plants on sour orange rootstocks from trees of the following scion-stock combinations that showed no symptoms: Pera sweet orange or Rangpur lime, rough lemon on its own roots, " cravo " tangerine on its own roots, and an unidentified citrus on its own roots. Various methods of control practised in Brazil have proved unsatisfactory. Control measures in the future will consist chiefly in making new plantings with trees of scion-stock combinations that are resistant. The most satisfactory rootstocks have been sweet orange, rough lemon, Rangpur lime and sweet lime.—U/S. Department of Agriculture, and Instituto Agronômica of São Paulo, Brazil.

3369. Oberholzer, P. C. J., Mathews, I., and Stiemie, S. F.
The decline of grapefruit trees in South Africa. A preliminary report on so-called "Stem Pitting".
Sci. Bull. S. Afr. Dep. Agric. **297**, 1949, pp. 18, bibl. 8, illus., being *Agric. Res. Inst.* Ser. No. **19**, 3d.

Attention is directed to a serious decline (popularly termed " stem pitting ") of grapefruit trees in S. Africa which, in the opinion of the authors, threatens the future of the entire grapefruit industry in that country. Present knowledge indicates that it is as yet unknown in the principal grapefruit-producing centres of the world, viz. Florida, California, Texas, Arizona and Palestine. Its distribution in S. Africa is indicated, the symptoms associated with the malady are described and illustrated, and its effects on tree growth, yields and fruit sizes are discussed. It is suggested that severely affected 'trees should be eliminated. Preliminary

results indicate that the malady is readily transmitted by budding, and hence is probably of virus nature. The symptoms bear considerable resemblance to the so-called "blind pocket psorosis", and it is suggested that the disease is caused by a strain or strains of the psorosis virus. Present knowledge indicates that the disease is confined largely to grapefruit scions and that the rootstock does not seem to be of importance. Certain tentative suggestions are made towards a practical solution of the problem based on experimental evidence and general observations. Budwood should be taken only from old, healthy and productive parent trees. The possibility of finding parent trees, or limb sports on affected trees, that are tolerant, or even resistant, to the disease appears to be a promising field for study. Nucellar embryony affords another method of eliminating the virus from an infected clone without sacrificing its genetic constitution. [From authors' summary and conclusions.]

3370. KIELY, T. B.
Preliminary studies on *Guignardia citricarpa*, n.sp.: the ascigerous stage of *Phoma citricarpa* McAlp. and its relation to black spot of citrus.
Reprinted from *Proc. Linnean Soc. N.S.W.*, 1948, [1949], **73**: 249-92, bibl. 58, illus.
A description of citrus black spot and the causal fungus is given, and the different types of lesion on Valencia fruits, as the season progresses, have been classified.

3371. KIELY, T. B.
Black spot of citrus.
Agric. Gaz. N.S.W., 1949, **60**: 137-9.
Recommendations are given for the control of citrus black spot [*Phoma citricarpa*; see *H.A.*, 17: 2530] on the central coast of New South Wales. Young trees up to 10 years of age should receive a petal-fall bordeaux mixture spray of 4-4-80 strength, followed 6 or 8 weeks later by a second at 2-2-80 strength, the initial spray to contain ½ gal. of white spraying oil to each 80 gal. of fungicide. For trees up to 20 years old bordeaux mixture at 2-2-80 at petal fall and 6 weeks later is recommended.

3372. WAGER, V. A.
The occurrence of the black-spot fungus [*Phoma citricarpa*] in the citrus areas of South Africa.
Fmg S. Afr., 1949, **24**: 367-9, 374, bibl. 2, illus.
An account of the pycnospore and ascospore phases of the fungus is followed by brief notes on a survey of the fungus in the Union of S. Africa. Results are discussed and conclusions drawn. Why the fungus can be present in an area without producing disease symptoms is at present an unsolved problem. To prevent the appearance of the disease in infected areas, spray with bordeaux mixture 2-1-80 at two-thirds petal drop and twice subsequently at intervals of 6 weeks.

3373. RIPLEY, L. B., PETTY, B. K., AND HEPBURN, G. A.
Soil insecticides for the citrus snout-beetle.
Sci. Bull. Dep. Agric. S. Afr. **259**, [4+] 18 pp., 1947, from abstr. in *Rev. appl. Ent.*, 1949, **37**: 267-8.
Inter-still residue (composition stated) was the most satisfactory of the products commercially available. It gave over 85% mortality of newly-hatched larvae of the citrus snout-beetle, *Sciobius granosus*, Fhs., for more than 8 weeks in both laboratory and field, so that only two applications would be required to protect the trees throughout the oviposition period.

3374. ALIBERT, H.
Lutte contre la mouche des fruits. (Mediterranean fruit fly control.)
Fruits et Prim., 1949, **19**: 236-7.
In trials carried out by Services officiels d'Algérie 3 applications of DDT gave good control of Mediterranean fruit fly in citrus. The first treatment should be applied 8-10 weeks before fruit maturity and it should reach to the shelterbelt of the plantation. Thorough wetting is necessary. Spraying with DDT for fruit fly control was found to be effective at the same time against the orange pest *Cryptoblabes gnidiella*.

3375. FISHER, F. E., GRIFFITHS, J. T., Jr., AND THOMPSON, W. L.
An epizootic of *Phyllocoptruta oleivora* (Ashm.) on citrus in Florida.
Phytopathology, 1949, **39**: 510-12.
In October, 1948, an epizootic of rust mites occurred at Lucerne Park, Florida, in an unsprayed control plot of 30 grapefruit trees. The affected mites, recognized by their abnormal coloration, were found to be infected by an endoparasitic fungus, tentatively identified as a species of *Hirsutella* Pat.

3376. LEWIS, H. C., AND LANDON, W. E.
High volume spray dusters for outside coverage spraying.
Calif. Citrogr., 1949, **34**: 334, 373, illus.
A description of 3 new spray-dusters with a high volume capacity, and/or interesting adaptations, designed for use in Californian citrus orchards.

3377. GRIFFITHS, J. T., Jr., AND STEARNS, C. R., Jr.
The effects of airplane DDT applications on citrus groves in Florida.
J. agric. Res., 1949, **78**: 471-6.
In the trials described no deposits of more than 0·3 μg. of DDT per cm^2 were found, and, in November, populations of parasites and predators of Florida red scale (*Chrysomphalus aonidum*) were apparently normal. It is concluded that spraying with DDT as practised in the region would have no detrimental effects on Florida red scale control in citrus groves.—Citrus Experiment Station, Lake Alfred, Fla.

3378. SELTZER, R. E.
Bulk handling of Desert grapefruit.
Calif. Citrogr., 1949, **34**: 330-1, 339, illus.
A comparison of bulk handling with the use of field boxes in the handling of Desert grapefruit in Arizona. Figures are given which indicate that substantial savings can be made by bulk handling.

Tung.

(*See also* 3516, 3578.)

3379. SITTON, B. G.
The effects of different methods of girdling bearing and defruited tung branches.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 119-24, bibl. 4.

Different methods of girdling tung trees were tested at Bogalusa, La. Better healing resulted from the application of parallel knife cuts without removal of bark between such cuts. Better healing occurred after girdling in the form of a helix than from closed ring girdling. Covering wounds with waxed tape resulted in better healing than leaving them uncovered. Girdling did not significantly affect the number of fruit set the following season. A larger number of fruit set in 1945 on the new terminals of tung branches girdled and defruited in 1944 than on similar branches bearing fruit in 1945.

3380. Brown, R. T., and Potter, G. F.
Relation of fertilizers to cold injury to tung trees occurring at Lucedale, Mississippi, in March 1948.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 109-13, bibl. 5.

In a tung orchard at Lucedale, Mississippi, trees that had received liberal applications of nitrogen and potassium over a period of 7 years suffered practically no loss of bearing surface in a late freeze on 13th March, 1948, and set a full crop. The average loss of bearing surface on unfertilized trees, many of which were killed outright, was severe, and the crop was reduced by 75 to 80%. Data on yield, date of dropping of the mature fruit, shoot growth, and foliage disorders that have a bearing on cold resistance, are presented and discussed. [Authors' summary.]

3381. Potter, G.
Observations on cold injury to tung trees in Louisiana and Texas, occurring in late March 1948.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 114-16.

As affecting suitability for planting in northern Louisiana and eastern Texas.

3382. Large, J. R.
Rough bark of tung, a virus disease.
Phytopathology, 1949, **39**: 718-20.

Rough bark disease, caused by a virus which produces rough bark and willowy twisted branches of tung, *Aleurites fordii*, is described. Implanting buds from diseased shoots into healthy stocks has induced the disease in suckers.

Dates and other crops.

3383. Lindgren, D. L., Bliss, D. E., and Barnes, D. F.
Insect infestation and fungus spoilage of dates—their relation and control.
Pap. Calif. Citrus Exp. Stat. **584**, 1948, pp. 12, being reprint from *Rep. 25th Annu. Date Growers' Inst.*, bibl. 7.

Four species of nitidulid beetles and two species of pyralid moths infested the fruit of the four date varieties in six experimental plots under observation. Application of insecticidal dusts to date fruit bunches did not give satisfactory control of either the beetles or the moths. In one plot fungus spoilage was controlled most effectively by inserting wire rings between the fruit strands, and dusting the dates with Thiomate " 19 ". In other experimental plots Thiomate " 19 " was more satisfactory than Zerlate in sulphur, or Yellow Cuprocide in sulphur. Benzene hexachloride in kerosene sprayed on fallen dates not only killed the beetles but also prevented reinfestation of the dates for four weeks.

3384. Bliss, D. E., and Wilbur, W. D.
Progress report on the development of *Omphalia* root rot in artificially inoculated date palms.
Pap. Univ. Calif. Citrus Exp. Stat. **586**, 1948, pp. 12, bibl. 7, reprinted from *Rep. 25th Annu. Date Growers' Inst.*, 1948, pp. 19-23.

Results are recorded of an inoculation experiment with *Omphalia pigmentata* in a 4-acre, 18-variety date orchard near Mecca, California. Whereas primary symptoms (death and rotting of roots) were observed in all the varieties within four months of inoculation, the secondary symptoms (rapid wilting and death of leaves) first appeared in two Deglet Noor palms after six years.

3385. Evreinoff, V. A.
Le grenadier *Punica granatum* Linné. (**The pomegranate.**)
Fruits d'outre mer, 1949, **4**: 161-70, bibl. 6, illus.

Distribution, requirements, varieties, propagation, planting and cultivation, disease and pest control.

3386. Švan-Gurĭckiĭ, I. P.
The Chinese fig Unabi. [Russian.]
Priroda (Nature), 1949, No. 3, pp. 68-78, bibl. 8.

The Chinese fig, *Zizyphus sativa*, has been cultivated in China for over 4,000 years, but in western Europe and in Russia it is found only as an ornamental tree in gardens and parks. In China over 100 varieties are found; the fruits of 12 of these are briefly described. Its food value (protein, sugar, and vitamin content) and medicinal properties are mentioned. Vegetative propagation is by suckers and cuttings. It has no great preference for any particular type of soil, and a plea is made for its cultivation in the middle Asiatic regions of the U.S.S.R. which are unsuitable for other fruits.

3387. Evreinoff, V. A.
Le caroubier ou *Ceratonia siliqua* L. (**The carob, *C. siliqua*.**)
Rev. int. Bot. appl., 1947, **27**: 389-401, bibl. 30 [received 1949].

Briefly covers its main characters, the chemical composition of its " beans ", its origin, requirements, yields, and varieties in different countries. Also its propagation (by seed, cuttings, or grafts), cultivation, harvesting, diseases and pests.

3388. Martin, W. J., Lutz, J. M., and Ramsey, G. B.
Control of black rot in washed, uncured sweet potatoes.
Phytopathology, 1949, **39**: 580-2.

The tests described show the effectiveness of the borax-dip treatment for the control of black rot (*Ceratostomella fimbriata*) in washed, uncured sweet

potatoes, and the ineffectiveness of the emulsion wax containing sodium orthophenylphenate.

3389. KUSHMAN, L. J., AND COOLEY, J. S.
Effect of heat on black rot and keeping quality of sweet potatoes.
J. agric. Res., 1949, **78**: 183-90.
Subjecting sweet potatoes, freshly dug from soil infested with *Endoconidiphora fimbriata*, to 110° F. for one day or more and then curing at 85° and 80% humidity prevented the development of black rot in storage and killed the fungus on the lesions.—U.S. Department of Agriculture.

Noted.

3390.
a CHEVALIER, A.
Les Jujubiers ou Ziziphus de l'Ancien monde et l'utilization de leurs fruits. **(The jujube or ziziphus of the ancient world: the use of its fruits.)**
Rev. int. Bot. appl., 1947, **27**: 470-83, bibl. in text, illus. [received 1949].

b CRESSMAN, A. W., MUNGER, F., AND BRADBENT, B. M.
Tests with parathion for California red scale control.
Calif. Citrogr., 1949, **34**: 332, 350-1, bibl. 3.

c LEMAISTRE, J.
La psorose, maladie des agrumes. **(Psorosis of citrus.)**
Fruits d'outre mer, 1949, **4**: 256-60, bibl. 11.
An illustrated review of the literature.

d MARTIN, C. M., AND REUTER, F. H.
Isolation of a pectic substance from passion fruit (*Passiflora edulis*).
Nature, 1949, **164**: 407, bibl. 3.

e MUNGER, F.
Rate of development of California red scales [*Aonidiella aurantii* resistant and nonresistant to hydrocyanic acid gas, as affected by temperature.
J. agric. Res., 1949, **78**: 451-6.

f TKATCHENKO, B.
La culture du Tung en U.R.S.S. **(Tung growing in the U.S.S.R.)**
Rev. int. Bot. appl., 1948, **28**: 32-48, bibl. 55.

TROPICAL CROPS.

(*See also* 2953, 3026-3028, 3106, 3192, 3280, 3281, 3534, 3550, 3552-3554, 3564, 3568, 3571, 3580, 3587.)

General.

3391. TEMPANY, H. A.
Land-utilization in the wet tropics.
Emp. J. exp. Agric., 1949, **17**: 148-56, bibl. 26, illus.
The super-humid tropics present special problems of land-use; the heavy and continuous rainfall, high humidity, and high temperature produce the typical conditions that differ markedly from those of sub-humid regions, with heavily leached soils and rapid disappearance of organic matter when drainage is unimpeded; when drainage is impeded leaching is restrained, mineral fertility is higher, and organic matter accumulates; the soils are heavier and in their natural condition often unusable, but when reclaimed by drainage they may be of great value and have a wider range of uses than upland soils. On uplands, permanent orchard crops are the most suitable form of cultivation as they permit the nearest approximation to natural conditions although limited possibilities in other directions exist. In alluvial lowland areas, although orchard crops may grow well, annual crops can be grown, and there is some scope for animal husbandry. On this account these regions are specially important from the point of view of food-supply. Correct land-use is essential in view of growing populations and demands for food, and on this account the limitations imposed on land-use as a consequence of conditions must be recognized. [From author's summary and conclusion.]

3392. S., G. C.
Note on a simple method of plant propagation by cuttings.
Trop. Agriculture, Trin., 1949, **26**: 4, bibl. 1.
" Cuttings of a number of plants have been established without any special propagator for humidity control, by the use of the following simple technique. Before being set out in beds, the cuttings are dipped (except for the parts to be inserted in the ground) in liquid paraffin wax of low melting-point. A greater percentage of success, and stronger plants, can be obtained by the use of a proprietary hormone preparation in conjunction with the above technique. With the white variety of Bougainvillea, the following results were obtained: Control 22%, paraffin wax treatment 67%, paraffin wax and hormone (powder) 100%. Stem cuttings of breadfruit, which is generally propagated by the somewhat tedious method of root-cuttings, have been successfully established by the paraffin wax plus hormone powder technique described above."

3393. JOHNSTON, A.
The germination of malvaceous seeds.
Trop. Agriculture, Trin., 1949, **26**: 63, bibl. 5.
Experiments are reported in which seeds of *Malachra alceifolia, Malvastrum coromandelianum, Sida rhombifolia* and okra, *Hibiscus esculentus*, were treated in two ways before sowing: (1) immersion in H_2SO_4 (conc.) for varying periods, (2) part removal of testa. In all species, germination was greatly improved and accelerated by either treatment, but cutting was superior to the sulphuric acid method. The optimum period of immersion for the latter varied; for *Malachra* it was 15-30 minutes, for *Malvastrum* 10-30 minutes and for *Sida* 30-60 minutes, or possibly more; okra germinated best after 3 hours' immersion but there was no appreciable falling off even after 22½ hours.

3394. CHEVALIER, A.
Quelques arbres fruitiers et oléagineux peu connus de l'Afrique tropicale: Canaris et Safous. (Some little known fruit and oil-bearing trees of tropical Africa.)
Rev. int. Bot. appl., 1949, **29**: 385-95, bibl. 3, illus.

It is suggested that certain species of *Canarium*, *Pachylobus*, and *Santiriopsis*, which are described, are of potential value. No selection has yet been carried out amongst them, but *Pachylobus edulis* has several varieties of merit.

3395. HUME, E. P.
Some ornamental vines for the tropics.
Circ. fed. Exp. Stat. Mayaguez, Puerto Rico, **31**, 1949, pp. 72, illus., 25 cents.

The information gained over a period of 40 years at Mayagüez on native and introduced ornamental vines is presented here and should be very welcome to dwellers in other parts of the tropics or sub-tropics where frosts are seldom experienced. Some 60 individual plants belonging to a large number of genera and species are described in detail and the cultivation problems of vines in general are discussed. An identification key is included.

3396. RANGEL GALINDO, A.
Las cajuelas de humificación. **(Humus pits [for soil conservation].)**
Agric. Trop. Colombia, 1949, **5**: 3: 52-9, illus.

A soil conservation practice, useful for coffee, cacao and fruit plantations on sloping land, is that of digging small trenches at regular intervals between the rows. These trenches break up the slope of the land, collect eroding soil and water draining down the slope, expose the lower layers of the soil to atmospheric action, and can be used as compost pits for fallen leaves, weeds, etc. The author discusses methods of construction, when such a system is advisable, and how it may be combined with other soil conservation measures, such as individual terracing [see abstr. 3419.]

3397. DE HAAN, J. H.
Het Bureau der Landinrichting. **(The Land Utilization Bureau [in Indonesia].)** [English summary 1 p.]
Landbouw, 1949, **21**: 132-52.

The purpose of this bureau is to conserve natural resources, such as soil and water, and to stimulate and improve agricultural production. An account is given of its aims and activities since it became a separate division of the Department of Agriculture in 1948.

3398. WILLIMOTT, S. G.
Malayan food composition table.
Sci. Ser. Dep. Agric. Fed. Malaya **23**, 1949, pp. 34, bibl. 15+52, $2.

Includes analyses of pulses (14), vegetables (29), roots and tubers (21), fruits (28), nuts (7), mushrooms, cloves, cacao, coffee, curry, sugarcane, tea, etc.

3399. BÜNNING, E.
Über die Beschleunigung des Blühens in tropischen Gebirgen. **(The acceleration of flowering in tropical mountains.)** [English summary 3 ll.]
Biol. Zbl., 1948, **67**: 3-6, bibl. 10.

In Java and Sumatra many temperate plants, especially ornamentals, which do not flower at lower altitudes, bloom readily high up in the mountains. This is partly due to a shortening of the critical length of day, as the temperature decreases. Thus, long-day plants can flower in tropical regions despite the shortness of the days.

3400. COOMBES, G. A. N., AND JULIEN, J. H.
The production of vegetable seeds in Mauritius (1943-1946).
Bull. Gen. Ser. Mauritius Dep. Agric. **50**, 1949, pp. 38, Rupee 1.

An account of a venture, begun as a wartime emergency measure, which has yielded interesting results, e.g. it produced no evidence in support of the common belief that temperate region vegetables raised from locally produced seed are degenerate, it showed that the seeds of certain vegetables (lettuce, dwarf beans, peas, brinjal, Chinese-radish, -kale, and -cabbage) can be produced successfully in Mauritius, it resulted in the improvement of certain vegetables, notably Mauritian cauliflower, and it paved the way to a markedly better standard of market gardening. The varieties grown and the diseases and pests from which they suffered are listed. Recommendations are made. [See also *Tech. Communication 19* of this Bureau.]

3401. HOPKINS, E. F., AND OTHERS.
Investigations on the storage and preservation of seed in Puerto Rico.
Bull. Puerto Rico agric. Exp. Stat., Rio Piedras **72**, 1947, pp. 47, bibl. 22 [received 1949].

An account of storage studies with vegetable and other seeds. The factors of temperature and humidity were varied simultaneously in numerous experiments and their importance in controlling the moisture content and the keeping quality of the seed was shown. The best condition for maintaining viability of seed is low temperature combined with low humidity. In practice, seed can be preserved for a reasonable period at atmospheric temperature, if the relative humidity is 20% or less. An added advantage of proper storage is increased germination brought about by an after-ripening process. A practical and cheap dehydrating agent for use in seed storage was discovered in ordinary clay subsoil, oven-dried to remove the hygroscopic moisture. Experiments were made on the rate of dehydration of beans and its effect on the formation of hard seed. The reversibility of this condition was demonstrated. Practical methods for the storage of seed in Puerto Rico are suggested. [From authors' summary.]

Cacao.

3402. HARTLEY, C. W. S.
Investigations into the growing of cocoa in Malaya.
Malay. agric. J., 1949, **32**: 59-69, bibl. 5, illus.

A discussion of policy and a detailed description of the experimental work carried out with cacao in Malaya since Professor Cheesman's visit of 1948 to report on the possibilities of establishing a cacao industry there. [See *H.A.*, 18: 2971.]

3403. CHEESMAN, E. E.
Yields in cacao experiments [Trinidad] 1945-46.
Trop. Agriculture, Trin., 1948, **25**: 14-18, bibl. 2 [received 1949].

Eleven tables show the yields for 1945-46, those for the four previous years, and aggregate yields since planting, as well as other relevant data. "The real interest of the figures lies in their illustration of the many factors combining to influence the yield of any clone in a given year. In these experiments, where soil variation within plantings is largely neutralized by the lay-out, the chief factors are age, season, and past performance. Of those factors, past performance is the one which most complicates yield studies in all tree crops, and notoriously makes their behaviour more difficult to interpret than those of annuals." The subject of biennial bearing and whether it occurs in cacao is briefly discussed.

3404. RICHARDS, D. A.
Notes on the vegetative propagation of cacao by cuttings.
J. hort. Sci., 1948,* **24**: 192-9, bibl. 13.

A record of results obtained at the West African Cacao Research Institute, Tafo, Gold Coast, from the use of growth promoting substances on root initiation and growth of cacao cuttings. Certain technical matters regarding the types of cuttings used are also described. The following abstract is from the author's summary. Semi-hardwood cuttings were treated with Hortomone A, indolylbutyric acid, potassium indolylbutyrate, indolylacetic acid, phenylacetic acid, phenylpropionic acid, and a mixture of growth substances, in dilute and concentrated solutions and with lanolin and in talc dust. Potassium indolylbutyrate in a dilute solution gave significant increases in number rooted and in root length. Concentrated dips for one second using indolylbutyric acid, potassium indolylbutyrate, and a mixture of indolylbutyric acid, phenylacetic acid and β-naphthaleneacetic acid, gave significant increases in percentage of cuttings rooted and in mean root length. Talc dust mixed with indolylbutyric acid gave significant increases, and this method was the most simple to apply. Types of cutting material, including dwarf, leaf-bud, root and hardwood cuttings were all successfully rooted but were more difficult to establish than the usual semi-hardwood type of cutting. Trinitario type cacao rooted significantly more easily than West African Amelonado.

3405. MORALES, M. O.
Construccion y aprovechamiento de los semilleros de cacao. (**The construction and advantage of seedbeds for the propagation of *Cacao*.**)
Agric. trop. Colombia, 1949, **5**: 8: 17-18, illus.

The normal local practice of sowing 2 or 3 *Cacao* seeds at the foot of a shade tree results in uneven development and makes irrigation and protection from pests difficult. The author recommends the use of seedbeds, and describes their construction and the best method of sowing and transplanting.

* Appeared August, 1949.

3406. TEMPANY, H. A.
The threatened future of cocoa.
World Crops, 1949, **1**: 10-14, illus.

A discussion of the world position in the cocoa industry now threatened by various pests and diseases, which if not checked will cause widespread destruction of plantations. The structure of the industry makes the application of plant protection measures particularly difficult.

3407. BOWMAN, G. F.
Report on Gold Coast cacao.
Inf. Bull. Turrialba, 1949, No. 13, pp. 4-5.

Some abstracts from a report on a visit to the Gold Coast cacao areas in late 1948. The author is Chief of the Inter-American Cacao Centre at Turrialba, Costa Rica.

3408. HANCOCK, B. L.
A laboratory colour test for the diagnosis of swollen shoot of *Theobroma cacao*.
Trop. Agriculture, Trin., 1949, **26**: 54-6, bibl. 5.

Swollen shoot of cacao can be demonstrated by the more rapid colouring of sections of stems immersed in anhydrous acidified methyl alcohol. The increased rate of colouring is small and owing to the uncontrolled variation it is necessary to make a number of observations and assess the results statistically. In practice, 16 pairs of observations on suspected and healthy stems are made and the significance of the results is estimated by a simple application of the "t" test. The test can be applied to stems stored under moist conditions for three weeks. "While this colour test is not sufficiently positive to form a simple field test for swollen shoot it is of some value as a laboratory test which can yield reliable results provided the necessary precautions are taken. In practice, it is useful for the recognition of the most virulent virus in material cut from the trees and sent some distance to the laboratory."

3409. CIFERRI, R.
Estudios sobre cacao. (**Studies on *Cacao*.**)
Rev. Fac. nac. Agron., Colombia, 1948, **8**: 395-413, bibl. in text.

The incidence of 2 disorders of *Cacao* was studied in the semi-arid, irrigated estate of the Centro Experimental de Cacao, Ocumare de la Costa (Estado Aragua). I. A comparison of the incidence of physiological wilt of young fruits showed that Criollo types of *Cacao* were more susceptible than the hybrid *Forastero venezolana*, and the purple-shelled Criollos more susceptible than the white-shelled ones. No correlation could be established between the morphology of beans and the incidence of wilt. II. Primary, systemic infection of the pods by *Phytophthora palmivora* was shown to come from infected inflorescences. Although the period of greatest susceptibility is from the time the pods are 9-10 cm. long to the time of completed development, an early infection can occur at the time when incidence of physiological wilt is highest. White-shelled Criollo varieties were more susceptible than the purple-shelled ones and *Forastero venezolana*, anthocyanin pigment in the shell apparently giving some resistance. In the wet months incidence of infection in the *Forastero* hybrid was more than twice that occurring in the dry months, while in the

Criollo types it remained almost constant. Secondary infection from airborne spores occurred much more readily during the wet months.

3410. CIFERRI, R.
Una virosis del *Cacao* en Colombia y en la Republica Dominicana. **(A virus disease of *Cacao* in Colombia and Santo Domingo.)**
Rev. Fac. nac. Agron. Colombia, 1948, **8**: 79-84, bibl. 6, illus.
A new disease of *Cacao*, previously only observed in Santa Domingo, is reported from the Cauca Valley, Colombia. Its virus nature has been established by transmission through grafting. The symptoms are described, and the name "narrow leaf crinkle" is proposed.

Cinchona.

3411. VAN WEZER, A.
De kina cultuur. **(The cultivation of cinchona.)**
Cult. Hand., 1949, **15**: 433-7.
An account of cinchona growing in the Belgian Congo. The chief pest is *Helopeltis*, which is controlled by pyrethrum dust.

3412. ENGELBEEN, M.
Contribution expérimentale à l'étude de la biologie florale de *Cinchona ledgeriana* Moens. **(An experimental study of the floral biology of *Cinchona ledgeriana* Moens.)**
Publ. Sér. sci. Inst. nat. Ét. agron., Congo belge **40**, 1949, pp. 140, bibl. 102, illus., 120 Fr.
Is mainly concerned with the mode of fertilization of the flower as it concerns the technique of plant selection.

3413. PLANK, H. K., AND WINTERS, H. F.
Insect and other animal pests of cinchona and their control in Puerto Rico.
Bull. fed. Res. Stat. Mayaguez, Puerto Rico **46**, 1949, pp. 16, bibl. 16, illus.
Thirty species of insects, three mites, and one snail have been found on cinchona in various stages of growth. Several species of thrips causing severe damage to small seedlings were held in check by repeated applications of derris dust containing 1% rotenone.

Cloves.

3414. HASANIA, Y. O. K.
Zanzibar and the clove industry.
Poona agric. Coll. Mag., 1949, **40**: 2: 23-6.
Includes a short, popular account of clove growing in the Zanzibar Protectorate, and some production figures.

3415. HENDERSON, M. R.
The genus *Eugenia* (Myrtaceae) in Malaya.
Gdns' Bull. Singapore, 1949, **12**: 1: 1-293, bibl. in text, illus., $10 or 25s.
Mainly botanical descriptions of 139 species, including the clove tree.

Coffee.

3416. SALVADOR CASTRO, M.
La industria cafetera del Huila. **(The coffee growing industry of Huila [Colombia].)**
Agric. trop. Colombia, 1948, **4**: 12: 16-17.
A short historical review of the development of the industry, and a criticism of its standards of production.

3417. PORTÈRES, R.
Les arbres, arbustes et arbrisseaux conservés comme ombrage naturel dans les plantations de caféiers indigènes de la région de Macenta (Guinée française) et leur signification. **(The trees, bushes and shrubs kept for shade in the native coffee plantations of the Macenta area, French Guinea, and their significance.)**
Rev. int. Bot. appl., 1949, **29**: 336-55.
A study based on observations made on 53 plantations. Numerous species are listed grouped according to their frequency of occurrence.

3418. COTTINGTON, E.
Propagation of coffee from cuttings.
Mon. Bull. Coff. Bd Kenya, 1949, **14**: 55, illus.
An account of a method developed in Kenya since 1944—earlier experiments started in 1937 were unsuccessful. The propagators used resemble ordinary glass-topped frames, but the sides are stone-built and the hinged tops almost airtight. The rooting medium used is "a 50% mixture [by volume ?] of coffee hullings and clean sand" over coarse rubble. Cuttings are prepared from suckers 8 or 9 in. long, the base of each being cut wedge-shaped. Primary branches are removed but not leaves. The best types of cuttings are those from the suckers which develop when multiple stem bushes are bent over. Although there is no conclusive evidence of any benefit derived by so doing, cuttings are dipped in hormone powder (Seradix B) before planting. Under ideal conditions cuttings begin to root in about 4 months and most of them can be transplanted at 6 or 7 months and the remainder after 8 or 9 months. The air humidity of the frames is kept high by spraying the cuttings with water 3 times daily. Rooted cuttings are transplanted to banana-leaf pots and hardened off in the propagators [cf. method of propagation used in Tanganyika for some years, see *E. Afr. agric. J.*, 1940, 5: 323-9, and *H.A.*, 10: 690. See also *Tech. Comm.* 13 of this Bureau.—ED.].

3419. RANGHEL GALINDO, A.
Las terrazas individuales, sus caracteristicas y su aplicacion a los cafetales Colombianos. **(Individual terraces, and their application in the coffee plantations of Colombia.)**
Agric. Trop. Colombia, 1949, **5**: 1: 39-46, illus.
A system of terracing for orchards on hilly land is described, in which an individual platform is cut out and built up round each tree. The details of construction are described, and the advantages of this system for prevention of soil erosion, preservation of water and fertilizers, encouragement of root growth and ease of harvesting are discussed. Especially suitable for

coffee plantations, it can also be used with advantage in fruit orchards.

3420. Suarez de Castro, F.
Caracteristicas de las lluvias en una zona cafetera de Colombia y uso de los datos pluviográficos en el cálculo de obras de defensa de suelos. **(Rainfall data for a coffee growing area in Colombia, and their use in the calculation of soil conservation practices.)**
Rev. Fac. nac. Agron. Colombia, 1948, **8**: 146-7.

The author points out the inadequacy of the conventional rainfall data, presented in monthly and yearly averages and totals, and suggests a method of measuring rainfall that would be of more value in estimating the type of terracing, drainage, etc., required in a certain area. The suggested unit of measurement is the shower, recorded in terms of intensity, duration and frequency. For calculation of soil conservation practices, these data must be considered in relation to the type of soil, vegetation and topography and gradient of the land.

3421. Misael Saldarriaga, V.
El sombrio y la conservacion de los suelos en la zona cafetera. **(Shade and soil conservation in coffee plantations.)**
Agric. trop. Colombia, 1949, **5**: 8: 35-9, illus.

The author discusses the value of shade trees for the conservation of soil in coffee plantations. He then deals with their propagation, and the importance of selection of seeds, bacterial inoculation for leguminous trees, and the use of nurseries. As the transplanting of these trees from nursery beds is difficult, he advises sowing the seed in pots made from the split stems of plantain which readily decompose when planted out in the soil. The construction of these pots is described in detail.

3422. Melville, A. R.
Routine testing to determine the population of antestia and lygus in coffee.
Mon. Bull. Coff. Bd Kenya, 1949, **14**: 125.

A practical note for Kenya planters on estimating the population of both pests on their plantations before and after treatment with insecticides. The sample taken should be 2 trees per acre, chosen at random. Two overlapping bottom sheets are placed on the ground under each tree. A top sheet, hanging down evenly all round, is then thrown over the tree and a spray, made from 1 lb. fresh pyrethrum in 1 gal. lighting grade kerosene, is directed under it. Any bugs which fall are collected immediately, 15 to 20 minutes later the tree is shaken and a second collection of bugs, if any, is made. The sheets are then removed. When the average number of antestia per tree exceeds two, general control measures are necessary. In the case of lygus or capsid, control is needed when the pest exceeds an average of 4 bugs per tree. Forty-eight hours should be allowed to elapse before testing the effect of treatment with pyrethrum dust, or a week in the case of DDT and BHC.

3423. Notley, F. B.
The control of Antestia in coffee.
E. Afr. agric. J., 1949, **15**: 25-8, bibl. 14.

Figures are given showing the degree of antestia control achieved in experiments at the Coffee Research Station, Lyamungu, Tanganyika, during recent years by means of arsenite baiting, pyrethrum dusting, and DDT. The fear that DDT might adversely effect the biological complex is briefly discussed.

3424. Aagaard, B.
Mealybug and wettable D.D.T.
Mon. Bull. Coff. Bd Kenya, 1949, **14**: 56.

An account of a Kenya planter's experiments, in the second of which 50% wettable DDT powder (1 lb. in 3 pt. water) was painted on the stems of coffee bushes in bands 8 in. deep. Ants crossing these bands died in great numbers. The author recommends the treatment for small outbreaks of mealybug, where the parasite *Anagyrus kivuensis* is present, and for painting on suckers during the conversion of a coffee plantation from single to multiple stems.

3425. Robertson, J. K.
The control of white stem-borer (*Anthores leuconotus*) in Arabica coffee.
E. Afr. agric. J., 1949, **15**: 35-7, bibl. 5.

An account of a campaign conducted against white stem-borer in coffee. Mechanical extraction of *Anthores* grubs on a large scale is not practicable. Chemical control is both effective and practicable using ethylene dichloride carbon tetrachloride, either alone or diluted with an equal volume of petrol, which is introduced into the borer holes on cotton wool. Certain species of *Coffea*, notably *C. excelsa*, show considerable resistance to *Anthores* and the possibility of grafting *C. arabica* on the resistant *excelsa* is mentioned.

3426. Schmitz, G.
La pyrale du Caféier Robusta *Dichocrocis crocodora* Meyrick. Biologie et moyens de lutte. **(The coffee moth *Dichocrocis crocodora*: biology and control.)**
Publ. Sér. sci. Inst. nat. Ét. agron. Congo belge **41**, 1949, pp. 132, bibl. 183, illus.

An account of the history, taxonomy and life cycle of the coffee moth, with control measures. The recommendations for its control include: (*a*) the destruction of the adults by beating with brooms, (*b*) collecting and burning the young larval colonies, (*c*) application of insecticides as the colonies begin to disperse, using arsenate of lead (½% suspension in water), or wettable DDT powder as a water suspension (0·1% DDT), (*d*) clearing the soil of fallen leaves and larvae when the larvae descend from the trees, and (*e*) the introduction of the moth's parasites, particularly *Trichogramma luteum* and *Apantales congoensis*.—Station of the I.N.E.A.C. at Bambesa.

3427. Pereira, H. C.
Factors affecting the quality of coffee.
Mon. Bull. Coff. Bd Kenya, 1949, **14**: 57.

A short progress report of 1948-9 experiments in Kenya, to test the effects of: extra washing of coffee during fermentation, the application of nitrogenous and phosphatic fertilizers, and compost, to soils, and of copper sprays to the bushes. Extra washing gave brighter roasts and substantial, but variable, improvements in raws and liquors. Spray applications of N to bushes improved quality in one class, but soil

applications showed no effects on quality. No quality responses were detected from applications of phosphates or compost. There was no evidence that copper improved quality.

3428. MENDES, C. T.
O tratamento do café por maceração. (Submersion treatment for coffee.)
Rev. agric. S. Paulo, 1949, **24**: 75-98.
Experiments are described that indicate the good effect of submersion on the quality of coffee beans. The process involves total submersion in a tank of water for 3 days, the tank being drained during the night. This submersion prevents aerobic fermentation. It is, moreover, an efficient method of destroying the coffee berry borer in the berries. [Submersion in water for varying periods before pulping is a well-known practice elsewhere, e.g. East Africa.—ED.]

Fibres.

(*See also* 3586.)

3429. ANON.
The sisal industry of British East Africa.
World Crops, 1949, **1**: 97-102, illus.
The history and development of the East African industry, now the most important world source of hard fibres, and the role of field investigations, are described. The outlook for the industry is discussed.

3430. BRANDON, T. W.
Treatment and disposal of waste waters from decortication of sisal.
E. Afr. agric. J., 1949, **15**: 3-11, bibl. 2, illus.
A report on an investigation undertaken by the Water Pollution Research Laboratory, D.S.I.R., Great Britain, at the request of the Kenya Government. "Large-scale experiments showed that the waste waters could readily be treated by biological filtration, with re-use of effluent for further decortication. By this method of operation, in which the liquid was continuously re-circulated through the system at a high rate, water consumption could be reduced by over 80% and no waste waters need be discharged. The capital cost of the installation required at a factory processing 100 tons of leaves daily would be about £8,000. By adopting a process of dry decortication, with subsequent washing of fibre, the polluting character and the cost of treatment of the waste waters could be reduced by nearly 90%. Recovery of flume tow and extraction of valuable by-products from sisal flesh would be greatly facilitated by dry decortication."

3431. DEN DOOP, J. E. A.
Prospects for the utilization of sisal waste.
E. Afr. agric. J., 1949, **15**: 15-24, bibl. in text.
An article which holds a warning for the East African sisal industry and stresses the need for more efficient use of the soil and the utilization of by-products.

3432. POLITZER, W.
Flume tow recovery and sisal by-products.
E. Afr. agric. J., 1949, **15**: 12-14, bibl. 22.
The author shows how a more efficient recovery of flume tow could be obtained on sisal plantations and describes the extraction of sisal wax as a by-product.

3433. VARELA MARTINEZ, R.
Produccion del fique en Colombia. (Production of *Agave americana* in Colombia.)
Agric. trop. Colombia, 1948, **4**: 12: 13-15.
This brief note explains that, apart from 3 large centres of production in Antioquia, Cauca and Santander, the *Agave* industry in Colombia is in the hands of small farmers. Production and export figures are analysed.

3434. CHEVALIER, A.
Nouvelles observations sur les Arbres à Kapok de l'Ouest africain. (New observations on West African kapok.)
Rev. int. Bot. appl., 1949, **29**: 377-85, bibl. 7, illus.
Species of the genera *Ceiba* and *Bombax* are described. It is recommended that in the Sudan zone [of French West Africa] the red-flowered *Bombax* be planted rather than *Ceiba*. Only grafted plants from high-yielding clones should be used.

3435. DAVID, P. A.
Kenaf (*Hibiscus cannabinus* Linn.) culture in the College of Agriculture at Los Baños [Philippine Is.].
Philipp. Agric., 1948, **32**: 21-8, bibl. 7, illus., being *Exp. Stat. Contr.* **1492** [received 1949].
An account is given of a small-scale trial (randomized plots, replicated) of two varieties, *viridis* and *vulgaris*, introduced from Cuba. The height of the plants, their branching, the length and diameter of the stems, the number of capsules, and the percentage and yield of dry fibre per plant were affected by the rate of seeding or spacing between plants. No significant difference in these characters was observed at 50 and 60 plants per square metre but both spacings were better than that of 70 plants per metre. For seed production, kenaf should be planted at 15 to 50 plants per sq. metre; for fibre production at 50 plants per sq. metre.

3436. TAMMES, P. M. L.
Over de cultuur van Manilla hennep in Indonesie. (The culture of manila hemp in Indonesia.)
Landbouw, 1949, **21**: 103-14, bibl. 6, illus.
The cultural requirements and methods of preparation of manila hemp are described. It is suggested that a manila hemp industry might successfully be established in Indonesia, provided that the best clones were chosen, and the plantations were sited in the plains of high rainfall districts. The failure of previous attempts is attributed to insufficient care on these two points.—Makassar Division, General Agricultural Research Station, Buitenzorg.

3437. U.S.D.A. AND UNIVERSITY OF FLORIDA.
Ramie production in Florida, a summary of a progress report.
[*Mim. Publ.*] *U.S. Dep. Comm., Office tech. Services, industr. Res. Dev. Div.*, 1948, pp. 8.
A highly condensed report referring very briefly to the following aspects of the subject: plant introduction, breeding and selection, variety trials, maturity studies, manuring, harvesting equipment, new decorticating and drying machinery, pressure degumming tanks, in-line

degumming equipment, research on degumming methods, fibre testing, by-products.

Fruits.

(*See also* 3555.)

3438. VIALARD-GOUDOU, A.
Teneur en acide ascorbique des fruits tropicaux en Cochinchine. **(The ascorbic acid content of tropical fruits in Cochin China.)**
Fruits d'outre mer, 1949, **4**: 89-93, bibl. 30.
The values obtained by the author are tabulated and compared with those reported by other workers. The fruits richest in vitamin C are litchi, papaya, longan, guava, mango and citrus.

3439. MALAN, E. F.
Production of bananas in South Africa.
Farmer [*Natal*], 1949, **38**: 34: 11, illus.
The cultivation of this crop in S. Africa has advanced since the war, the area now grown being about 7,000 morgen [=14,777 ac.] and the annual crop some 250,000 tons, a large proportion of which is produced by Indians on the Natal coast. Brief notes are given on climatic, soil, and water requirements, propagation, planting, cultivation, and harvesting. The most popular commercial kind is Swartstam, *Musa cavendishii*, which is still free from Panama disease.

3440. CADILLAT, R. M.
La production bananière de l'Union Française est en augmentation. **(Banana production in the French territories on the increase.)**
Fruits d'outre mer, 1949, **4**: 67-9.
Export figures during 1948 are given for individual banana producing territories.

3441. BAEYENS, J.
De banaangronden in Tropisch West-Afrika. **(The banana soils of tropical West Africa.)**
Bull. Kon. Belg. Kol. Inst., 1947, **18**: 3: 787-98, from abstr. in *Landbouwk. Tijdschr.*, 1949, **61**: 439-40.
An extensive study carried out in the Cameroons, Mayumba and the Lower Congo leads the author to conclude that the banana is one of the most exacting of tropical plants. It requires a rainfall of 2,000-5,000 mm. well distributed throughout the year with no dry season, and a soil homogeneous to a depth of at least 1 m., with a good moisture-holding capacity and crumb structure. The water level must not be high. Only in very favourable districts (Central America, Brazil and the Cameroons) can large plantations be grown without special care. In other districts irrigation, deep cultivation, and heavy manuring are necessary. A table showing data from typical banana soils is included.

3442. CHIRINOS OVALLES, F. B.
Posibilidades del cultivo del banano en las costas del Caribe. **(Possibilities of banana growing in the countries bordering the Caribbean.)**
Agric. venez., 1948, **13**: 132: 36-7, illus.
Some banana production figures are given for the Caribbean countries. The success of some banana growing enterprises there indicates the suitability of the region for this purpose. Marl soils, with a neutral or slightly alkaline reaction, that can be efficiently irrigated and drained, are necessary. Control measures for the three most important diseases, caused by *Fusarium bulbigenum cubense*, *Cercospora musae* and the virus known as " Hereque " are dealt with.

3443. ANON.
Squirter and black-end diseases of bananas.
Agric. Gaz. N.S.W., 1949, **60**: 193-4.
A regulation becoming operative on 1st May requires that bananas shall not be sold in New South Wales between 1st May and 30th November each year unless (*a*) the fruit has been treated with, or dipped in, a fungicide containing salicylanilide at a concentration sufficient to kill *Nigrospora sphaerica*, the cause of squirter disease, and (*b*) the package containing the bananas is marked with the name of the fungicide, followed by the word " treated " or " dipped " as the case may be. The disease and the necessary measures for treatment are described.

3444. MERNY, G.
La maladie de sigatoka du bananier (*Cercospora musae* Zimm.) aux Antilles françaises. **(*Cercospora* leaf spot of banana in the French Antilles.)**
Fruits d'outre mer, 1949, **4**: 263-4.
In Martinique, especially in the area of Champflore, *Cercospora* leaf spot has caused greater damage to bananas than in Guadeloupe, where drying seawinds have better access to the plantations. Altitude, apart from closeness to the sea, has been found to be another environmental factor checking the spread of the disease. Chemical control is at present hardly practicable under the conditions of the French Antilles.

3445. CUILLÉ, J.
Étude d'entomologie appliquée sur *Cosmopolites sordidus* Germ. Charançon du bananier. **(An entomological study of the banana root borer, *C. sordidus*.)**
Fruits d'outre mer, 1949, **4**: 206-13, 249-55, bibl. 39.
The author is about to publish an entomological study of the destructive banana pest, *Cosmopolites sordidus*, carried out in French Guinea at the I.F.A.C. field station near Conakry and at the central fruit station at Kindia. (See also *H.A.*, 17: 441.) In this article he presents an advance copy of the chapter dealing with the practical aspects of control. While great importance is attached to good cultivation methods, which are discussed at some length, active control measures, viz. proper hygiene methods and trapping, are necessary to keep the weevil in check. Measures to avoid contamination include rotation, destruction by fire or poison of all superfluous suckers and of badly affected trees and heat treatment of transplants (at least 45° C.). Benzene-hexachloride should be applied to transplants, to planted suckers, to the base and stem of trees and to banana debris of any sort lying about in the plantation. The use of the insecticide is recommended to prevent the settling of the pest on the trees rather than to effect impressive kills. The latter can be effected only by trapping the adults. Traps are made, according to

description, from basal sections of the pseudo-stem and are placed on the soil in the immediate neighbourhood of the bananas, two to each tree. So far frequent emptying of the traps by hand is required, which is laborious and does not lead to a 100% destruction of the weevils caught. Treatment of the traps with benzene-hexachloride either repels the pest or prevents the formation of the attracting substance. However, it is hoped that the addition of a strong attractant to the insecticide will counteract the repellent effect, thus enabling traps to be used without involving hand collection.

3446. Tkatchenko, B.
l'Anacardier. **(The cashew-nut.)**
Fruits d'outre mer, 1949, **4**: 199-205, 241-8, 281-7, bibl. 65, illus.

A comprehensive article on the origin and botany of *Anacardium occidentale*, its cultivation, varieties, yield and numerous products, primary and secondary. Note the bibliography.

3447. Dubois, L., and van Laere, R.
Le manguier au Congo Belge et au Ruanda-Urundi. **(The mango in the Belgian Congo and Ruanda-Urundi.)**
Publ. Dir. Agric. Élev., Minist. Colon. Bruxelles, 1948, pp. 83, bibl. 19, illus., 30 francs.

This study is a welcome contribution to the all too scanty literature on the mango in Africa. Short introductory sections on distribution, morphology, biology, ecology and phenology precede the main part of the work—the cultivation of the crop. No less than six methods of grafting are shown, in addition to the common approach graft. Numerous varieties are described and illustrated, including 13 varieties from Florida and the Dutch East Indies introduced by the I.N.E.A.C. fruit research station at M'Vuazi. A few concluding pages are devoted to plant selection, the utilization of fruit and wood, and the trade in mango fruits.

3448. McKnight, T.
Yellow crinkle disease of papaws [in Queensland].
Qd agric. J., 1949, **69**: 153-7, illus.

A description of this virus disease and some of its features is followed by suggestions for controlling it, among them: the adoption of a multiple planting system to allow for losses; the isolation of seedbeds and their treatment with DDT; and, where practicable and desirable, the control of suspected weed carriers.

3449. Hi, L.
Culture et industrialisation de l'ananas en Guinée et en Cote-d'Ivoire. **(The cultivation and processing of pineapples in French Guinea and in the Ivory Coast.)**
Fruits d'outre mer, 1949, **4**: 214-18.

An analysis of the pineapple industry, with data under many headings and suggestions for its further development. Large-scale processing promises to give stability to an expanding market.

3450. Py, C.
La fasciation de l'ananas. **(Fasciation in pineapple.)**
Fruits d'outre mer, 1949, **4**: 180-2, bibl. 2.

Twenty degrees and types of fasciation in pineapple are described and photographically illustrated. The frequency of the trouble under certain conditions in French Guinea suggests that the cause is a disturbance of the nutritional balance. Experiments are being initiated in that territory with the object of inducing fasciation artificially. Meanwhile growers in very humid locations are advised to be moderate in the use of sulphate of ammonia. The necessary dosage should be supplied in 4 applications, the first at planting, the last round about the beginning of fruit formation.

3451. Sideris, C. P., and Young, H. Y.
Growth and chemical composition of *Ananas comosus* (L.) Merr., in solution cultures with different iron-manganese ratios.
Plant Physiol., 1949, **24**: 416-40, bibl. 67.

Most satisfactory growth was obtained with culture solutions containing 0·5γ Fe and 5·0γ Mn. Where ammonium nitrogen was supplied, concentrations of Mn in the tissues were only half as great as where nitrate nitrogen was given, due presumably to antagonism between Mn^{++} and NH_4^+. Iron concentrations, however, were greater in the tissues of the ammonium cultures. Certain amounts of iron and manganese in the leaf tissues were in combination with definite protein fractions, the amounts of protein increasing with iron but decreasing with manganese. The tissues of high-Mn cultures contained more Mg than those of low Mn cultures, but absorption of other nutrients was unaffected. The effect of the Fe/Mn ratio of the solution on the sugar, starch, and ascorbic acid content of the tissues was also investigated. It is suggested that Mn chlorosis may result from a replacement of Fe by Mn in the pyrrole ring of protoporphyrin 9, a precursor of chlorophyll.—Pineapple Research Institute, Hawaii.

Palms.

3452. Anon.
Oil palms.
World Crops, 1949, **1**: 15-17, illus.

Habitat, cultivation, production, manuring, pests, and diseases are briefly discussed. It is argued that while the shortage of vegetable oils continues, permanent crops such as oil palm hold out the best prospects for making really substantial additions to world supplies of vegetable oils, since an increase of 500,000 acres in the area planted might be expected to raise the annual outturn of oils and fats by approximately 500,000 tons per annum in 7 years.

3453. Burgos Lizarzaburu, J. A.
El cultivo de la palmera aceitera en el oriente Peruano. **(The cultivation of the oil palm in Eastern Peru.)**
Bol. Estac. cent. Colon., Tingo Maria **10**, 1948, pp. 59, bibl. 21.

The African oil palm (*Elaeis guineensis*) could become a very important source of oil in Eastern Peru. Although only introduced 20 years ago, it is well suited to the climate and there are large areas of land suitable for its commercial production. Using information obtained from the literature and data established at the Estación Central de Colonización at Tingo Maria,

a full account is given of the requirements and cultivation of this crop, extraction of the oil, and the economics of its production.

3454. Chapman, G. W., and Gray, H. M.
Leaf analysis and the nutrition of the oil palm (*Elaeis guineensis* Jacq.).
Ann. Bot. Lond., 1949, **13**: 415-33, bibl. 12.
This work, in which the relationship between the nutrition of the oil palm and the mineral composition of its leaves was studied in Malaya, is an extension of earlier work on the nutrition of the rubber tree [see *H.A.*, 11: 1406]. The variation in nutrient content of the sample material, according to its position in the frond and age of the frond, was determined. It is shown that the ratio K_2O/P_2O_5 (R) in the leaves is of primary importance in determining the response to potash or phosphate manuring, and the optimum value of R for yield is between 2·5 and 3·5. With R below 2·5 potash was the deficient nutrient, and its use as manure increased both yield and leaf potash, which therefore showed a significant correlation. It also increased leaf nitrogen. With even lower values of R (1·36) the application of phosphates actually depressed yield. With R above 3·5 phosphate was the deficient nutrient, and its use as manure increased yield and leaf phosphate. With extreme phosphate deficiency, manuring with potash depressed yield. Although nitrogen was often correlated with yield, manuring with nitrogen never increased yield. In immature palms, growth is shown to be correlated with leaf composition. The incidence of magnesium deficiency is shown to be related both to absolute leaf magnesium and to the ratio CaO/MgO. Ammonium sulphate intensifies magnesium deficiency by reducing leaf magnesium.

3455. Hartley, C. W. S.
The felling and disposal of old oil palms prior to replanting.
Malay. agric. J., 1949, **32**: 223-30, illus.
Felling and disposal of oil palms by mechanical and poisoning methods are described. Poisoning with sodium arsenite is shown to be the cheaper method. In poisoning, 1 oz. of sodium arsenite per tree is as effective as 2, 3, or 4 oz. The cost of disposal of palms by this method is $2 to $3 per acre. Of the two mechanical methods tried, felling by bulldozer is preferred to felling by a cable drawn by two tractors. Heavy tractors are necessary, with consequent high cost of depreciation and repairs. [From author's summary.]

3456. Innes, R. F.
The manganese content of leaf and inflorescence tissue in relation to the "unknown disease" of the coconut palm in Jamaica.
Trop. Agriculture, Trin., 1949, **26**: 57-60, bibl. 7.
Detailed descriptions are given of the inflorescence symptoms of the "unknown disease" and of another condition which is the cause of much sterility in coconuts. The data presented prove that there is no obvious relationship between the incidence of disease and the manganese content of palm leaf tissue.

3457. Dol, J.
Copra en coprafonds in Oost-Indonesië. (**Copra and the Coprafund in East-Indonesia.**)
[English summary 1½ pp.]
Landbouw, 1949, **21**: 85-102.
An account of the work of the central organization known as the Coprafund in reviving copra production and exports in East Indonesia after the Japanese capitulation. As a result of its activity, copra exports in 1948 reached 216,000 tons as compared with 49,000 tons in 1946.

Rubber.

(*See also* 3277-3279.)

3458. Rubber Research Scheme, Ceylon.
Collection and planting of clonal seed.
Adv. Circ. Rubb. Res. Scheme, Ceylon **27**, 1949, pp. 4.
Some notes on correct methods for collecting seed from approved areas of budded clonal rubber on Ceylon estates. Apart from observing the limits of isolation laid down for obtaining reliable seed, the result of crossing between approved clones, other precautions are necessary. All estates undertaking to supply clonal seed must ensure that trees in clonal seed areas are authentic budgrafts of the clones approved. Although the male parent cannot be established with any certainty, it is always possible to make sure of the female parent by the characteristic shape and markings of the seed, which remain the same within a clone. The seed coat is solely dependent on the character of the mother tree and independent of the male parent. A few seed characters which are useful in identification work, apart from markings, are illustrated. A plan of the layout of a replanted area approved as a source of clonal seed is also given, as well as a list of clones regarded as good parents. With most clones self-fertilization is exceptional.

3459. Simpson, H. J.
Further investigations into the mechanical clearing of felled rubber lands.
Malay. agric. J., 1949, **32**: 231-5, bibl. 1, illus.
A major operation is described and the following recommendations are made: for the proper organization of tractor work aiming at maximum efficiency, the chief necessities are proper maintenance of tractors and sufficient trained mechanics and operators.

3460. Rubber Research Institute, Malaya.
Poisoning of rubber trees with sodium arsenite.
Circ. Rubb. Res. Inst. Malaya **29**, 1949, pp. 7.
This supersedes *Circ.* 23 of 8.2.47. Two methods are described. 1. Poisoning by frill-girdling and the application of sodium arsenite in solution (½ lb. of arsenite for large trees and ¼ lb. for small), and, 2, poisoning by ring-barking and painting with sodium arsenite in a tapioca-starch paste. Method 1 is effective and kills a large tree at a cost of about 25 cents [of a Malay dollar]. Method 2 is promising and costs only about 9 cents per tree. The second method may be used for thinning young plantations. There is a note on poisoning in relation to root disease.

3461. Rubber Research Institute, Malaya.
R.R.I.-type smoke-houses.
Plant. Man. R.R.I. No. 9 1949 pp. 44, $2.
This manual brings up to date, and within the compass of a single publication, the R.R.I.'s recommendations on the construction and operation of tunnel type smoke-houses.

Sugar cane.

(*See also* 3548, 3572.)

3462. Wasson, R. A., and McCrory, E. R.
Louisiana sugarcane.
Bull. La St. Univ. and agric. mech. Coll. **15,** 1949, pp. 25, illus.
This bulletin, which replaces Extension Circular 151, " offers practical recommendations on the production of Louisiana sugar-cane " and indicates the important changes in sugar-cane cultivation that have come about in recent years. The following aspects of the subject are discussed *seriatim*: drainage, rotation, soil preparation, seed cane, planting, varieties, cultivation, fertilizers, weed control, sugar-cane borer control, diseases, mechanical harvesting, and the importance of proper topping.

3463. Turner, P. E.
The Louisiana system of sugar-cane cultivation.
Trop. Agriculture, Trin., 1948, **25**: 33-6.
Introductory notes on climate and soil precede descriptions of the special field layout adopted, the sequence of field operations, and mechanized harvesting and loading. All mechanized field-operations in Louisiana are carried out with the use of high-clearance rubber-tyred tractors which straddle the 6-ft. beds. Comparison is made between Louisiana and Trinidad conditions.

3464. Šarapov, N. I.
The sugarcane in Russia.
Priroda (Nature), 1948, No. 10, pp. 55-9, bibl. 9, illus.
The history of sugar-cane growing in Russia is outlined. The types of soil suitable for this crop are discussed, particularly in relation to conditions in Asiatic Russia. The Institute of the Dry Subtropics is engaged in raising varieties suitable for those regions, and the yield and sugar-content of two Florida selections are tabulated. Sugar-cane cultivation is thought to have great possibilities in the southerly regions of central Asia, particularly for the production of rum.

3465. Parthasarathy, S. V.
Index for earliness in sugarcane.
Curr. Sci., 1949, **18**: 172-3, bibl. 4.
After brief mention of certain external and internal factors influencing the ripening of sugar-cane, the author reports some of his experimental results from which he concludes that: (1) even when the soil is in its maximum moisture-holding capacity, varieties exhibit characteristic differences in the moisture content of the different plant parts, (2) the maximum moisture-holding capacity of the tissues is closely associated with the earliness and richness of cane. The hypothesis is advanced that earliness is inversely related to the moisture-holding capacity of the tissues. It is claimed that many of the agronomical findings recorded so far can be explained in terms of this new hypothesis which opens up the possibility of testing earliness or richness of sugar-cane in the seedling stage.—Sugar. Res. Stat., Anakapalle, Madras.

3466. Venkataraman, T. S.
Sugarcane × bamboo hybrids.
Curr. Sci., 1949, **18**: 218.
Sequel to the hybridization between the sugarcane × the bamboo.
Ibid., 1949, **18**: 258.
It is stated that later cytological, morphological and other work has supported the author's claim to have crossed sugar-cane and bamboo at Coimbatore, India, in 1936.

3467. Sartoris, G. B., and Belcher, B. A.
The effect of flooding on flowering and survival of sugar-cane.
Sugar, 1949, **44**: 1: 36-9, from abstr. *Soils and Ferts*, 1949, **12**: 1468.
The effect of natural floods on sugar-cane growing in muck soil in southern Florida is described. The first response was a growth of roots on the submerged nodes. Completely submerged plants died, but those with the growing point of the stem above water survived. It is possible that flooding induced flower development.—U.S.D.A.

3468. King, N. J.
Irrigation waters of the Bundaberg area [Queensland].
Tech. Commun. Bur. Sugar Exp. Stats, Qd, No. **1**, 1949, pp. 16, bibl. 7, map.
A study undertaken following the great increase in area of irrigated sugar-cane in this district since 1932. No systematic study of the quality of the various water-bearing beds had hitherto been attempted. " A number of waters from each of the three geologic areas have been analysed and their compositions compared, particularly on the basis of ionic ratios." Irrigation plant data from numerous localities are tabulated.

3469. Knowles, W. H. C., and Cameron, C.
Field experiments with sugar cane. XVII.
Sugar Bull. Brit. Guiana Dep. Agric. **17,** 1949, pp. 1-35, bibl. 2.
An account of the results from 51 variety, manurial, and cultivation trials carried out by the Sugar Experiment Station, British Guiana, in 1948. The results of the variety trials suggest that estates should continue to make their main planting in B.34104 and to a lesser extent in D.14/34. Results from manurial trials are tabulated. There are indications that the microplot method for predetermining the manurial requirements of sugar-cane is unreliable under local conditions. The short duration of the beneficial results from cultivation trials supports the suggestion that they are, at least in part, due to the extra tilth imparted by filling in old drains or digging and refilling new ones during subsoil drainage.

3470. Rouillard, G.
Travaux réalisés en 1948 par le Centre Agronomique du Nord. **(1948 report of the Northern Agronomic Centre [Mauritius]).**
Rev. agric. Maurice, 1949, **28**: 55-64.

The first annual report of a project subscribed to by certain sugar-cane planters in Mauritius for the purpose of carrying out experimental work. 43 trials are referred to, of which 19 were harvested during the year, including experiments on manuring, cultivation, mulching, spacing effects of stone walls between cane rows, time of planting, herbicides, etc.

3471. STORY, C. G.
Q.50 as a standover cane [in Queensland].
Cane Gr. Quart. Bull., 1949, **13**: 32-3, illus.
During the past year in the Central districts, the seedling Q.50 has enhanced its reputation, in both plant and ratoon crops, as a high tonnage yielder with more than average sugar content. However, general experience indicates that the use of Q.50 as a stand-over variety would be more than a normal farm hazard, and should be avoided whenever possible.

3472. VEIGA, F. M.
Tratamento de toletes de cana com fungicides. **(Treatment of cane cuttings with fungicides.)**
Brasil-açúc., 1948, **32**: 352-5, from abstr. in *Rev. appl. Mycol.*, 1949, **28**: 421.
For the control of red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*], which killed a 25 ha. plantation in the Campos district, Rio, Brazil, in 1948, causing serious financial loss, Abavit proved to be the most effective fungicide, resulting in a germination percentage of 45·3% compared with 14·8% in the controls. The corresponding figures for Semesan, Agrosan, and Granosan were 40·3, 37·8, and 29·3% respectively.

3473. KNOWLES, W. H. C.
The variety and fertilizer position of the sugar industry. XIV.
Sugar Bull. Brit. Guiana Dep. Agric. **17**, 1949, pp. 39-50.
A summary of the varietal composition of the 1949 harvest in British Guiana, the cycle age of the crops, their commercial yields, and fertilizer imports.

3474. GREEN, V. E., BYRNSIDE, D. S., AND STURGIS, M. B.
More nitrogen for sugarcane.
Bett. Crops, 1949, **33**: 6: 42-3.
Fertilizer experiments carried out at the Agricultural Experiment Station, Baton Rouge, La, indicate that in most cases 40 lb. per acre of nitrogen can profitably be applied to plant cane in Louisiana. The data also show that 60-80 lb. of nitrogen per acre, 25-40 lb. of P_2O_5 and 40-60 lb. of K_2O applied to stubble cane have definitely given good results under normal conditions of soil moisture and good weed control on medium soils.

3475. GUISCAFRÉ-ARRILLAGA, J.
Formation of galls in stems and leaves of sugar cane in response to injection of growth regulating substances.
Phytopathology, 1949, **39**: 489-93, bibl. 9, illus.
The substances inducing galls were indoleacetic acid, 2,4-D and a mixture of naphthalene acetic acid and colchicine.—Louisiana State University.

Tea.

(*See also* 3578.)

3476. EDEN, T.
The work of the Agricultural Chemistry Department, 1927-1948.
Monograph on tea production in Ceylon, No. **1**, Tea Res. Inst., Ceylon, 1949, pp. 78, bibl. 117.
This bulletin, which summarizes the work of the past 21 years, describes the evidence on which certain general principles have been established and indicates their practical bearing on tea cultivation in Ceylon. Only the main lines of work which have given definite results are considered. The subject is dealt with under the following main heads: the use and interpretation of field experiments; the response of the tea crop to fertilizer nutrients; the tea bush and the crop; cultivation and weeds; soil structure and erosion; composting and green manuring.

3477. SIMPSON, H. J.
Propagation of tea from cuttings.
Malay. agric. J., 1949, **32**: 70-6, bibl. 2, illus.
The value of vegetative propagation is discussed as a means of raising average yields of tea estates. The method of the Tea Research Institute of Ceylon of propagating tea by internodal cuttings and its adaptation to lowland Malayan conditions is described. Cuttings in which the axillary shoot has developed, the "fish" leaf, first true leaf and a bud, root more quickly than those with the axillary bud still undeveloped. Although fairly well marked differences were observed between the rooting capacity of cuttings of individual bushes, it is considered that these are not sufficiently great to be of commercial importance. A preliminary small scale field trial of planting cuttings direct into their permanent positions instead of undergoing nursery treatment is described. Cuttings planted direct in the field proved to be no more difficult to root than under nursery conditions, and sufficient successes were obtained to produce a full stand of bushes. [From author's summary of conclusions.]

3478. KANAGARATNAM, N.
Mechanical plucking of tea with the "Tarpen Trimmer".
Malay. agric. J., 1949, **32**: 260-3, bibl. 1, illus.
Experimental results are reported from which it appears that the use of this unit is not economical and practicable under the prevailing wage rates and system of planting tea in Malaya, but, by lengthening the blade, sufficient labour might be saved to justify its use. Tea planted in hedges would be more suitable for mechanical harvesting. To make the machine less expensive to run, it might be modified considerably, e.g. it could be made more portable. One important disadvantage of the machine is that the quality of the resulting made tea is poor. In monsoon countries, where the flush is more dependent on the season, it is possible that a mechanical plucker could be used with better results because the fibre develops later.

3479. LEVER, R. J. A. W.
The tea mosquito bugs (*Helopeltis* spp.) in the Cameron Highlands [Malaya].
Malay. agric. J., 1949, **32**: 91-108, bibl. 21, illus.

An account is given of the appearance, life history and habits of two species of Mirid bugs, *Helopeltis bradyi* Waterhouse and *H. cinchonae* Mann (or a closely related species). These bugs are easily the most important pests of highland tea in Malaya and, during certain periods, do considerable damage by sucking sap from the leaves and shoots of tea bushes. Local tests indicate that three dustings of 5% DDT carried out as often as every 10 days at a rate of not less than 30 lb. per acre checked the damage but did not give the hoped-for residual effect. Dusting should be done over as large an area as possible at one time, especially during the dry periods of the year when the insect is at lowest numbers. Small pockets of the bugs should be dusted with hand dusters as soon as noticed just after plucking in those fields. The eggs of *H. cinchonae* are parasitized by a small Hymenopterous parasite, *Erythmelus helopeltidis* Gahan, but although one-third of the eggs have been found to be thus attacked this cannot be a substitute for dusting. [From author's introduction and summary.]

3480. KALANDADZE, L. P., AND DŽAŠI, V. S.
A polyphagous tortrix moth (*Tortrix* (*Eulia*) *politana* Haworth) as a pest of the tea bush. [Russian.]
Doklady vsesojuz. Akad. selsk. Nauk S.S.S.R., 1949, No. 9, pp. 3-7, bibl. 4, illus.

The tortrix *Eulia politana* is reported as causing damage to tea bushes in Adžar (Adzhar) A.S.S.R. in 1948. The larvae damage buds, leaves and young shoots. The young larvae eat the leaf tissues, chiefly from the lower side, causing yellowish (later greyish) spots 2-3 cm. or more in length, often partly skeletonizing the leaves. Control measures suggested are (*a*) collecting and burning the debris after pruning the bushes, (*b*) collecting and destroying distorted leaves with larvae and pupae, together with fallen leaves and shoots, (*c*) spraying the bushes with a contact poison (against the eggs).

Vanilla.

3481. FRAPPA, —.
Sur l'acclimatement en milieu naturel de jeunes vanilliers obtenus de semis en milieu aseptique. **(The establishment under natural conditions of young vanilla plants grown from seed aseptically.)**
C.R. Acad. Agric. Fr., 1949, **35**: 312-15, bibl. 3.

Young vanilla plants, raised aseptically in tubes containing glucose-agar with yeast, grew well when transferred to a mixture of coconut fibre, soil, and cow dung, and kept in the shade at greenhouse temperatures.

3482. JONES, M. A., AND VICENTE, G. C.
Quality of cured vanilla in relation to some natural factors.
J. agric. Res., 1949, **78**: 445-50.

Vanilla beans that ripened early, although smaller than those that ripened later, gave a cured product of somewhat higher quality than those harvested when the blossom end of the fruit was yellow. The altitude at which the beans were harvested appeared to have no effect on the quality. Beans from diseased plants were about the same in final quality as those from healthy plants, but were somewhat smaller.—U.S. Dep. Agric., Mayagüez, P.R.

Other crops.

3483. PLANK, H. K.
Control of the bamboo powder-post beetle in Puerto Rico.
Trop. Agriculture, Trin., 1949, **26**: 64-7, bibl. 13.

The greatest obstacle to the full utilization of many of the 35 species and varieties of bamboo introduced and established in Puerto Rico has been the early infestation of the harvested culms by the bamboo powder-post beetle (*Dinoderus minutus*). Systematic testing has thus far shown the first-year growth of 8 species and 1 variety to be appreciably resistant to the pest. Much of this resistance was associated with lack of starch in the wood, and, where little starch was present, resistance was correlated with low moisture content and high specific gravity. Resistance increased with air-drying. Among the least cumbersome methods for increasing resistance is the harvesting of culms of resistant ages and the drying, or curing, of freshly cut culms in the field. For preventing infestation in storage immediately after harvest, DDT has so far given better results than any other material. [From author's summary.]

3484. WHITE, J. S. L.
The cultivation of *Coleus rotundifolius* (Poir.) A. Chev. et Perrot (country potato) in Ceylon.
Trop. Agriculturist, 1948, **104**: 151-4.

A herbaceous annual grown on a small scale for its edible tubers which have a distinct aromatic flavour. Two varieties are named Singhala innala and Rata innala, the latter having the larger tubers. Cultural operations from planting to harvesting are described. Figures are given comparing its analysis with that of other tropical root crops. The crop is easily grown, is almost free of pests and diseases and is suitable for any wet-zone rotational scheme. There is ample scope for experiments in methods of cultivation.

3485. SLOOFF, W. C., THUNG, T. H., AND REITSMA, J.
Leaf diseases of sereh (*Andropogon nardus* L.). II. Leaf blotch caused by *Curvularia andropogonis* (Zimmerman) Boedijn Nov. comb.
Reprint from *Chron. Nat.*, 1947, **103**: 7, pp. 3, bibl. 1, illus. [received 1949].

This disease is of economic importance in the plantations of citronella-grass in the region of Buitenzorg. In field trials with 16 varieties of *Andropogon nardus*, 5 varieties (Tjiogreg 3, 9, 13, 24 and 25) proved highly resistant to the fungus. Content of total geraniol in these resistant varieties is, however, relatively low, and whether they will be suitable for commercial planting will depend on market demands.—General Exp. Stat., Buitenzorg.

3486. LOUSTALOT, A. J., AND POL, R. F.
The effect of harvesting citronella and lemongrass at three heights on yield and oil content.
Agron. J., 1949, **41**: 375-8, bibl. 7.

The effect of time of cutting on the yield of grass and essential oils of citronella and lemongrass was

determined in an experiment made at the Federal Experiment Station, Mayaguez, Puerto Rico. This experiment differed from others previously reported in that the time of cutting was determined by the height to which the grass had grown rather than by arbitrary time intervals. West Indian and Java varieties of lemongrass were harvested at 2 ft., 2½ ft. and maximum height (about 3½ ft.) (19, 17, and 10 times respectively) over a period of 3 years. Since the yield of oil per acre of the West Indian variety was not appreciably increased by frequent cuttings, it is considered most economical to harvest at maximum height. In the case of the Java variety of lemongrass, the greatest yield of grass and oil was obtained when the grass was cut at 2½ ft. The increased yield may justify the expense of additional harvests. Java and Guatemala varieties of citronella grass were harvested at 3½ ft., 4½ ft. and maximum height (about 6 ft.) (8, 11, and 15 times respectively) over a 4-year period. Both varieties yielded most oil per acre when cut at the medium height. Figures are given comparing the grass yield and oil content of the varieties of both species for the three harvest treatments.

3487. SCHOFFELMANER, V.
Semillas de quimbombó. **(Okra seeds [for oil].)**
Agric. venez., 1948, **13**: 132: 33, illus.

A note on the potential value of okra (*Hibiscus esculentus*) as an oil crop and as a substitute for cotton seed. Progress has been made at the State University of Louisiana in the breeding of dwarf varieties that do not shed their seeds readily and are suitable for combine harvesting. The greatest difficulty at present is the high percentage of crude fibre in the oil cake. This might be overcome by breeding varieties with thinner husks or larger seeds.

3488. CHOWDHURY, S.
Disease of pan (*Piper betle*) in Sylhet, Assam. Part VII. Effects of some soil treatments on the incidence of sclerotial wilt.
Proc. Indian Acad. Sci., 1948, **28B**: 228-39, from abstr. *Soils and Ferts*, 1949, **12**: 1491.

The sclerotial wilt of pan, as it occurs in Assam, can be effectively controlled by deep ploughing, green manuring, application of organic manures and fertilizer, and by growing other crops in the infested fields for a few years. Minor elements, Zn, Cu, Fe, Mn and Mg, as sulphates, were ineffective. $(NH_4)_2SO_4$ alone or with superphosphate and KCl, or either of the latter, was effective in suppressing the disease. Superphosphate or KCl applied singly, or in combination, were less effective but kept the mortality below that of the control plots. Lime and gypsum had no effect.—Cent. Potato Res. Inst., New Delhi.

3489. CHOWDHURY, S.
Disease of pan (*Piper betle*) in Sylhet, Assam. Part VIII. Effect of temperature on the development of sclerotial wilt of pan.
Proc. Indian Acad. Sci., 1948, **28B**: 240-6, from abstr. *Soils and Ferts*, 1949, **12**: 1490.

Optimum soil temperature for the development of the disease was found to be 28° C., although at 25° and 30° C. the disease was quite severe. There were no deaths at 15° and 40° C. At 20° C. there were more deaths than at 35° C.

Noted.

3490.

a CHAMPION, J.
Classification, origine et répartition géographique des espèces du genre Musa. **(Classification, origin and geographical distribution of the species of the genus *Musa*.)**
Fruits d'outre mer, 1947, **2**: 73-9, 251-4; 1948, **3**: 173-80; 1949, **4**: 16-24, 94-9 and 133-40.

b CHEESMAN, E. E.
Classification of the bananas. III. Critical notes on species. *i. Musa sanguinea* Hook *j. M. velutina* Wendl. et Drude.
Kew Bull., 1949, No. 2, pp. 133-7, bibl. in text, illus.

c CHEVALIER, A.
Nouvelles recherches sur l'arbre à beurre du Soudan (*Butyrospermum parkii*). **(New investigations on the shea butter tree.)**
Rev. int. Bot. appl., 1948, **28**: 241-56, bibl. 9, illus.

d CHEVALIER, A.
Dossier sur le cactus (Opuntias) espèces fruitières et fourragères. Espèces nuisibles. **(Notes on cactus (Opuntias), fruit and forage kinds. Noxious species.)**
Rev. int. Bot. appl., 1947, **27**: 444-54, bibl. 12 [received 1949].

e JOSEPH, K. V.
Note on the occurrence of the weevil *Diocalandra stigmaticollis* Gyll., as a pest of the coconut palm in Travancore [India].
Curr. Sci., 1949, **18**: 173-5, bibl. 4, illus.

f KEEPING, G. S.
Notes on some light tractors on trial at the Federal Experiment Station, Serdang [Malaya].
Malay. agric. J., 1949, **32**: 264-9, illus.

g KRAUSS, B. H.
Anatomy of the vegetative organs of the pineapple *Ananas comosus* (L.) Merr.—concluded. III.* The root and the cork.
Bot. Gaz., 1949, **110**: 550-87, bibl. 170, illus.

h LAL, K. N., SRIVASTAVA, S. N. S., AND PATHAK, H. S.
Studies in crop physiology. Effect of time of application of nitrogen upon growth, yield and juice quality of cane.
Trop. Agriculture, Trin., 1949, **26**: 51-3, bibl. 3.

i MARTYN, E. B.
Notes on a visit to Colombia. Some observations on the diseases of coconuts and bananas in the Province of Magdalena.
Trop. Agriculture, Trin., 1949, **26**: 48-50, bibl. 7, illus.

j NAVILLE, R. (OFFICE OF FOREIGN AGRICULTURAL RELATIONS).
La production mondiale d'ananas en 1947. **(World pineapple production in 1947.)**
Fruits d'outre mer, 1949, **4**: 31-3, adapted from *Foreign Crops and Markets*, Vol. **57**, No. 16.

* For I and II see *H.A.*, 19: 1564 and 2592i

STORAGE AND PLANT PRODUCTS.

(*See also* 2732, 2805-2807, 3284-3286, 3449, 3529, 3549, 3555, 3558, 3567.)

Storage.

3491. PENNEY, F. C.
Apple-packing [in N. America].
Agriculture, 1949, **56**: 266-9.
Some notes and figures on a 1948 visit to packing houses in America where there are signs that the bulk package may soon be out of date and replaced by a "consumer package" of 3-10 lb. Consumer packaging is unsuited to the normal packing house. New machinery is now being made that will pre-package apples into transparent film bags, holding 4, 5 or 6 lb., which are then packed in cartons. It is doubtful whether the rather softer British apple varieties would stand such treatment. The adoption of the fork-lift truck and the pallet system in certain packing houses has produced "amazing results" in saving labour. A new package seen was the moulded egg-carton type adapted for apples. Figures are given for the costs of growing and packing, to-day and pre-war, in America and Britain. The labour position in the two countries is compared. The success of growers' co-operative packing and marketing concerns on the Pacific Coast is stressed and the view expressed that there is a big future for such co-operatives in Britain.

3492. BARTA, E. J., AND LOWE, E.
Tentative recommendations for the treatment of berry boxes (hallocks) to reduce mold growth.
Publ. U.S. Dep. Agric. Bur. agric. industr. Chem. **AIC-239**, 1949, pp. 2.
The treatment consists of dipping the boxes in molten wax, which penetrates the wood and effectively covers the surfaces with a film impervious to the fruit juices. A mixture consisting of 5% microcrystalline wax (melting point 160-165° F.) and 95% standard paraffin (melting point 143-150° F.) is very effective. The temperature of the molten wax should be 15-20° F. above the melting point of the mixture, and the time of dip should not be less than 15 seconds.

3493. ULRICH, R.
Recherches expérimentales sur la réfrigération des fruits. **(Cold storage trials with fruit.)**
Fruits d'outre mer, 1948, **3**: 404-9, bibl. 4.
A report of preliminary results obtained at the cold storage experiment station, Caen, in storage triáls with pear, chestnut, apple, peach, cherry, strawberry and grapes. The relative merits of ordinary cold storage, gas storage and of a pre-treatment of the fruits are discussed as well as the troubles and diseases encountered.

3494. KIDD, F., AND WEST, C.
The refrigerated gas-storage of pears.
Food Invest. Leafl. D.S.I.R. Lond. **12**, 1949, pp. 12, bibl. 16.
This paper deals with the refrigerated gas-storage of home-grown Conference, Doyenné du Comice and Williams' pears, and is based on the results of experiments detailed in the authors' article in *J. Pomol.*, 1942, 19: 243-76 [*H.A.*, 12: 666]. *Pre-storage conditions.* The maturity of the fruit when gathered and the avoidance of delay between picking and storing are of paramount importance. A colour chart is provided by means of which the correct stage for picking may be determined. The use of oil wrappers is not advocated. *Storage conditions.* The temperatures and atmospheres recommended for storage are: 5% CO_2 and 2-3% O_2 at 33-34° F. for Conference; 5% CO_2 and 2-3% O_2 at 32-33° F. for Comice; 10% CO_2 and 11% O_2 at 33-34° F. for Williams'. The relative humidity usually varies between 85 and 95%. *Ripening procedure.* To obtain best dessert quality pears must be ripened at room temperature (60-65° F.). The stage at which the fruit has reached the limit of its storage life can be determined by use of the colour chart. Notes are given on operating a refrigerated gas store and the use of thermometers and gas indicators.

3495. CHOUARD, P.
Moss storage: has it a scientific basis?
Fruitgrower, 1949, **108**: 491-3, bibl. 7.
After dealing with the controversial questions of the effect of moss storage on ripening, rotting and wilting of fruit, and the absorption of acetaldehyde and ethylene, the author gives a brief account of the practical and economic aspects of the system.

3496. CASTBERG, C.
SPF: s lagringstävling 1948-49. **(Apple storage competition of the Swedish Pomological Society 1948-49.)**
Fruktodlaren, 1949, No. 4, pp. 102-4.
Cox's Orange, Cox's Pomona and Ribston were again the 3 top-ranking varieties. [See also *H.A.*, 19: 2534.]

3497. KESSLER, H.
Versuche zur Verhütung der Hautbräune an Lagerobst. **(The prevention of scald in stored apples.)**
Schweiz. Z. Obst- u. Weinb., 1949, **58**: 359-65, bibl. 2.
In one year's storage trials with 4 apple varieties grown in Switzerland oiled paper was found to give considerable control of scald. Shavings of oiled paper afforded much better protection than wraps, as the tabulated results show.—Wädenswil.

3498. PAUL, P., AND CRAVENS, M. E., Jr.
Storage of peaches of different degrees of ripeness.
Quart. Bull. Mich. agric. Exp. Stat., 1949, **31**: 402-5, bibl. 2.
In small-scale trials keeping peaches at room temperature gave the best overall results; after 6 days fruits stored at the firm-ripe stage were slightly superior to hard-ripe and green fruit. The storage life could be lengthened and still a satisfactory quality maintained by refrigerating the peaches at 32° F. for 9 days and keeping them at 77° F. for 5 further days. Fruit kept under refrigeration for a longer period tended to develop a mealy texture.

3499. BLONDEL, L.
Expérience sur l'action de la thio-urée sur la conservation des oranges. (Trials of thiourea for preserving oranges.)
Ann. Inst. agric. Algér, 1947, **3**: 171-7 [published 1948, received 1949].
The main conclusion is that thiourea is distinctly more efficacious than borax in preventing moulds in oranges.

3500. STEYN, A. P., AND ROSSELET, F.
Quantitative photometric determination of diphenyl in orange peel.
Analyst, 1949, **74**: 89-95, bibl. 5.
Extended use of wrappers impregnated with diphenyl for preserving citrus fruits has necessitated a search for an analytical method of sufficient sensitivity to assay the diphenyl absorbed by the fruit from the wrappers. A method was evolved by the authors for the determination of diphenyl in the presence of orange oil.—Low Temp. Res Lab., Cape Town.

3501. MACKELLEY, —.
La maturation artificielle des bananes. **(Artificial ripening of bananas.)**
Fruits d'outre mer, 1949, **4**: 51-62, illus.
The article is a well-illustrated adaptation from the *Banana ripening manual*, published in 1942 by the Fruit Dispatch Company. It contains a colour chart of 8 stages of fruit maturity.

3502. DEWEY, D. H., AND PENTZER, W. T.
Ultraviolet light treatment of peaches, nectarines, and plums for the control of transit decay.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 181-7, bibl. 3.
The trials reported and discussed here did not reveal any definite advantage from the use of ultra-violet treatment.—U.S. Dep. Agric., Fresno, Calif.

3503. SOUTHWICK, F. W.
Further studies on the influence of methyl α-naphthaleneacetate on ripening of apples and peaches.
Proc. Amer. Soc. hort. Sci., 1949, **53**: 169-73, bibl. 9.
In trials at Amherst, Mass., the methyl ester of α-naphthaleneacetic acid was found to stimulate the rate of respiration, softening and ground colour changes of pre-climacteric apples and peaches stored at room temperatures. After the end of the pre-climacteric phase no significant effect was noticeable under conditions of the experiment. There was no indication of inhibition of the ripening process at any stage.

3504. GUILLAUME, A., HOUSSIAUX, D., AND DURAND, M.
De l'action des basses températures sur les larves de parasites des châtaignes et la conservation ultérieure de ces fruits. **(The effect of low temperatures on the larvae of chestnut parasites and the subsequent storage of the nuts.)**
C.R. Acad. Agric. Fr., 1949, **35**: 310-12.
Low temperatures of −15° to −22° C. for 2 hours destroy the larvae of pests which develop in chestnuts auring ripening. If after such treatment the chestnuts dre put immediately in a room at 0° C., and kept there for 8 days, they are disinfected and can be eaten or stored in a controlled atmosphere.

3505. MOOI, J. C.
Toepassing van fusarex bij bewaring van aardappelen in kuilen. **(The use of Fusarex for the storage of potatoes in clamps.)**
Landbouwk. Tijdschr., 1949, **61**: 628-37, illus.
Extensive trials were carried out in Holland to determine the extent to which Fusarex will inhibit sprouting and prevent rots of Bintje seed potatoes stored in clamps. *Inhibition of sprouting*. Although results varied in different places it was generally found that the highest dose of 4½ kg. per 1,000 kg. potatoes was advisable in winter clamps made after harvest and left undisturbed until the spring. This quantity was also generally sufficient when applied in summer clamps, even though some of the vapour would be lost during subsequent sorting and transference to winter clamps. A thick covering of soil over the clamp to prevent loss of vapour was found to be important. Treatment did not affect germination at planting time. *Prevention of rots*. The most important storage rots, *Fusarium* spp., can be controlled to a varying, sometimes large, extent by Fusarex in the winter clamps. 4½ kg. per 1,000 kg. potatoes gave the best results. The control in summer clamps was less good. Fusarex did not control bacterial or wet rots. Specific recommendations based on the trials are made for growers in the 4 trial districts.

3506. DE JONG, W. H.
De bewaring van aardappelen in gebouwen. **(The storage of potatoes in buildings.)**
Landbouwk. Tijdschr., 1949, **61**: 610-27, illus.
The Netherland's Potato Storage Commission was set up in 1946 as a result of complaints from abroad about the poor crops produced by Dutch seed potatoes. This address, given by the secretary of the Commission in July, 1949, at Wageningen, outlines the work of the Commission (which includes studies of storage and transport methods, and of soil, weather and cultural factors that affect storage quality), and deals with various types of store. The construction of glass stores, mechanically-cooled stores, and insulated air-cooled stores is described, and their relative advantages for storage of seed potatoes for home use, seed potatoes for sale in bulk, and potatoes for the consumer market are compared.

3507. SAMUEL, G. G.
The storage of potatoes in buildings.
Farming, 1949, **3**: 140-4, bibl. 2, illus.
A general discussion of the subject followed by a description of American storage practice, an account of the three stages in the potato's storage life (post-harvest, winter rest, active growth), details of store design and management, and possible future trends in England.

3508. FOSS, E. W.
Air conditioning potato storages [in Maine].
Ext. Serv. Bull. Me agric. Exp. Stat. **392**, 1949, pp. 16, illus.
The following recommendations for the construction of potato stores and the fitting of air conditioning equipment in them are taken from the author's summary:

Roofs and attic floors need more insulation than side walls. Every attic space closed off from the store must be ventilated. A vapour barrier must be used on the inside wall. Circulating spaces in the walls and flues in the floor are necessary for the satisfactory operation of a forced air circulating system. These same floor flues are necessary for the operation of a bin unloader. Removal of all dirt from the potatoes before storage is desirable. Bin loaders are useful for this purpose. Exhaust fans, either propeller or blower types, are particularly valuable in cooling off stores during the fall. When exhaust fans are cooling off the store, all upper openings in the building should be closed. Air should come into the building at the lowest point. Fans should be used to equalize the temperature in trackside and large farm stores by taking the warm air from the top of the house and forcing it to the basement to return to the top through the flues and air circulating spaces. Heat is unnecessary in most well-insulated stores if there is a good circulation of air around the bins.

3509. SAMUEL, G. G., AND WILSON, A. R.
A summary of investigations on clamp storage of potatoes in England. [Dutch summary ½ p.]
Tijdschr. PlZiekt., 1949, **55**: 179-86, bibl. 14.
A review of the literature on clamp storage of potatoes with regard to the use of lime in clamps, temperatures inside the clamp, percentage CO_2, sprouting, loss in weight, chemical changes in the tubers, and the use of substances to inhibit sprouting.

3510. KELLY, W. C., AND SOMERS, G. F.
The effect of time of harvest, variety, and storage on the ascorbic acid content of potato tubers.
Amer. Potato J., 1949, **26**: 47-53, bibl. 8.
The ascorbic acid content of the tubers did not change as the tubers matured. Upon death of the tops, the ascorbic acid content of the tubers began to decline. The tubers continued to lose ascorbic acid in storage throughout the two-month storage period studied. [From authors' summary.]

3511. NEWHALL, A. G., AND WILKINSON, R. E.
Storage rots of squash in New York State.
Plant Dis. Reptr, 1949, **33**: 220-2.
During the storage period of from one to six months, losses from rot may reach 90% on the principal squash varieties Hubbard, Delicious and Acorn. The principal causes of loss were *Mycosphaerella citrullina*, *Rhizopus nigricans*, *Colletotrichum lagenarium* and species of *Botrytis*, *Cladosporium*, *Alternaria* and *Fusarium*. For rapid curing a greenhouse with plenty of ventilation and proper temperatures is much superior to common storage in a concrete or wooden building where humidities often go too high for too long a time.

3512. TUCKER, R. E.
Acceptability and ascorbic acid content of frozen Rhode Island vegetables.
Bull. R.I. agric. Exp. Stat. **302**, 1948, pp. 24, bibl. 25, illus.
A study of the effects of variety, methods of blanching and the type of frozen storage upon the acceptability and ascorbic acid content of broccoli, snap beans, spinach, and sweet corn. After being frozen and stored for 6 months, the cooked broccoli, snap beans and sweet corn retained approximately 30 to 40% of their original ascorbic acid, but spinach retained only 15%. Some suggestions are made for home freezing. [From author's abstract.]

Plant products.

3513. BUKIN, V. N.
Vitamins and their significance in national economics. [Russian.]
*Nauka i Zizn*j (Science and life), 1949, No. 3, pp. 30-6.
In the last section of this work on vitamins the author discusses methods of increasing the vitamins of fruit and vegetables by selection and breeding, pointing out that cultivated plants vary considerably in their vitamin content within the species, and indicating the range of the amounts of vitamin C, in tomato, sweet pepper, black currant, melon and apple, and of pro-vitamin A (carotene) in carrot, tomato, pumpkin apricot and wild rose. Centres at which work on vitamins is being carried out in Russia are mentioned.

3514. DEVONSHIRE, C. R.
Terms used on [coffee] liquoring reports.
Mon. Bull. Coff. Bd Kenya, 1949, **14**: 104-5.
An up-to-date glossary of terms used by the liquoring department of the Kenya Coffee Board, with some useful advice on how to read and interpret the reports under the heads raw, roast and liquor.

Noted.

3515.

a FIDLER, J. C.
Studies of the physiologically-active volatile organic compounds produced by fruits. I. The concentrations of volatile organic compounds occurring in gas stores containing apples.
J. hort. Sci., 1948,* **24**: 178-88, bibl. 22.—D.S.I.R., Ditton.

b GARNIER, M.
Note sur la "décoloration" des agrumes par l'éthylene. **(A note on inducing yellow colour in citrus fruits by ethylene gas treatment in the U.S.A.)**
Fruits et Prim., 1949, **19**: 303-11, illus.

c LINDE, J. E., Jr., AND KENNARD, W. C.
Preliminary study of the effects of waxing on weight loss and keeping quality of apples [in Pennsylvania].
Proc. Amer. Soc. hort. Sci., 1949, **53**: 177-80.

d MANDE, B. A., AND OTHERS.
Fermentation of *Bassia* flowers.
Industr. Engng Chem., 1949, **41**: 1151-4, bibl. 15.
A possible source of industrial alcohol.

* Issued in 1949.

NOTES ON BOOKS, REPORTS AND NEW PUBLICATIONS.

(*See also* 3249, 3250, 3267.)

3516. ACERETE, A.
Los Aleurites y el aceite de madera. (Aleurites **species, and wood oil.**)
Publ. Estación Experimental de Aula Dei, Zaragoza, 1949, pp. 85, bibl. 111, illus., 35 pesetas.

Apart from an abortive attempt made in 1935 to introduce the tung tree to Spain, nothing further seems to have been done in the matter. The author, however, has made an extensive study of its cultivation in other countries, and believes that it could become a valuable new industry in Spain. In this book he reviews the distribution of *Aleurites* species, their soil and climatic requirements, and the methods of cultivation employed elsewhere. This survey is supplemented by an excellent bibliography. *A. fordii*, being adapted to conditions suitable for citrus growing, is suggested as the most promising species for trials in Spain. Although it has greater winter hardiness than citrus, the susceptibility of the blossoms to late frost may be a problem. The possibility of overcoming this by spraying the trees with a growth substance to delay flowering is discussed. Composition of the fruit, extraction of the oil and properties of the various *Aleurites* oils are briefly dealt with. The material is spaced with a generosity that British publishers must envy.

3517. ACERETE, A.
Plantación de frutales. **(Planting fruit trees.)**
Publ. Estación Experimental de Aula Dei, Zaragoza, 1949, pp. 141, bibl. 93, illus., 45 pesetas.

The Spanish grower who fondly imagines that the planting of fruit trees is a simple operation has only to read this informative little book to realize how much forethought and careful planning is needed before even the first hole is dug. The author deals systematically with every problem that has to be decided when starting a fruit farm. Advice on selection of a site is followed by a consideration of the geographical and economic factors that affect choice of species, and pollination problems that affect choice of varieties. For choice of rootstocks, however, the reader is referred to the author's "*Cria de Frutales*" (*H.A.*, 19: 2574). Preparation of the soil, including levelling for irrigation purposes, planting systems and the actual procedure of marking out and planting an orchard are described and illustrated in detail that will be invaluable to the grower. The chapter on protection of orchards includes advice on hedges (the ornamental value of which is considered sufficiently important to justify a list of suitable ornamental hedge plants), windbreaks and protective sprays for newly-planted trees. Finally, the evils of underplanting an orchard with a catch crop are presented; among these the differences in irrigation requirements of crop and undercrop is an important factor in Spain. Although writing primarily for growers in Spain, the author refers to practices in other countries, and makes full use of recent research in England and America, as shown by the extensive bibliography.

3518. ANDERSON, E.
Introgressive hybridization.
John Wiley & Sons Inc., New York, in association with Chapman & Hall, London, 1949, pp. 109, 5 plates, 23 figs. in text, $3 or 18s.

This book is primarily concerned with one particular aspect of research into the evolution and genetics of wild plant populations and it makes no pretence to be either a textbook of orthodox genetics or a handbook for the practical plant hybridist. It takes its title from the name given to a process observed to occur frequently in the wild, whereby a natural hybrid between distinct species comes to resemble one of its parents more and more closely through successive back crossing. The author gives an interesting account of two wild populations in which such introgression is taking place, *Iris fulva* and *Iris hexagona* var. *giganti-caerulea* and their natural hybrids growing in the Mississippi delta. He performs a useful task in collecting the scattered sources of information on this subject, with the addition of much that is new from his personal observations and in presenting the whole subject in a manner that is not only comprehensible but interesting to the ordinary reader. His ideas and interpretation of the established facts will appear plausible to anyone acquainted with the known behaviour of plant hybrids and his work should stimulate the study of such wild populations in other parts of the world. This book can be recommended with confidence to all those interested in the genetical approach to the field study of evolution in plants. H.M.T.

3519. BARNES, H. F.
Gall midges of economic importance. Volume VI. Gall midges of miscellaneous crops.
Crosby Lockwood & Son, London, 1949, pp. 229, 14 plates, bibl. 362, 15s.

In the present volume the author deals with the gall midges of miscellaneous crops, amongst which are some very important plants, such as coffee, tobacco and rubber. The volume is divided into eleven sections treating of the gall midges associated with bamboos, basket willows, beverage plants, dye plants, fibre or textile plants, herbs, insecticidal plants, oil plants, rubber plants, spice and sugar plants.

The presentation of the text follows that adopted in the earlier volumes, and it may be noted that volume VI has been published before volume V which is still in the press.

Each section begins with an introductory paragraph outlining the uses for which the plants are cultivated. Next follows a list of the plants dealt with, together with a list of the midges that attack them. The nature or type of injury to the plant is given. This is followed by a description of the midge, and finally, control measures are discussed. The gall midges associated with and injurious to basket willows are discussed in detail, and the section relating to gall midges injurious to fibre or textile plants, and the midges associated with herbs, are of particular interest. Hops are dealt with under the

section entitled " Gall midges injurious to beverage plants ", and while this would appear to be the correct place for the hop, it is felt that the hop section should have appeared in volume IV also, since this plant is cultivated in this country on the same farms as fruit, and very frequently by the same growers.

The entertaining foreword has been written by Mr. A. Roebuck of the National Agricultural Advisory Service, while an appendix entitled " Chemotropic studies on the button top midge and other insects: a summary " has been especially prepared for this work by Mr. H. C. F. Newton, B.Sc. This volume may be regarded as the best of the five volumes as yet published. A.M.M.

3520. Biologische Zentralanstalt f. Land- u. Forstwirtschaft, Berlin - Dahlem. (Schlumberger, O., and others.)
50 Jahre deutsche Pflanzenschutzforschung.
(50 years of plant protection research in Germany.)
Deutscher Zentralverlag G.m.b.h., Berlin, 1949, pp. 232.

This jubilee publication on the 50th anniversary of the Biologische Zentralanstalt für Land- und Forstwirtschaft, Berlin-Dahlem, in 1948 gives an account of the institute's important activities in the past, and presents surveys on subjects of topical interest, including the following: Plant virus research; Colorado beetle; San-José scale; and immunity and resistance to potato wart disease, potato blight, phylloxera, woolly aphid; chlorosis, and potato degeneration. The publication concludes with a list of the scientific staff over the 50-year period.

3521. British Association for the Advancement of Science.
Scientific survey of North-Eastern England.
British Ass., Local Exec. Cttee, Newcastle-upon-Tyne, 1949, pp. 204+maps, bibl. numerous, illus.

This volume, which contains scientific accounts of the region around Newcastle, written by local experts, was prepared for the British Association meeting held in Newcastle-upon-Tyne from 31st August to 7th September, 1949. It includes a short chapter on agriculture, as well as sections on the natural history and industries of the region.

3522. Brock, R. B.
Outdoor grapes in cold climates.
Tonbridge Printers Ltd., Tonbridge, Kent, 1949, pp. 71, illus., 6s.

The author terms this *Report* No. 1 from the Viticultural Research Station, Oxted, Surrey. The estate, which lies on the top of a ridge in the North Downs, was first laid down to vines in the spring of 1946 by the author, who felt very strongly that the evidence of successful open-air vinegrowing in centuries gone by in England warranted an attempt at its reintroduction. The present small book should suffice to give the necessary impetus to many who have been of the same way of thinking but have not had the persistence or opportunity to carry out the spade work of the author. He first summarizes a few salient facts gleaned from current continental practice and then proceeds to describe briefly his practical operations and observations in Surrey. He deals with training the vines, layout of the vineyard, soils and surfaces, propagation, treatment, spraying and dusting, the use of cloches and choice of varieties, and he ends with practical advice to those who want to start growing vines under cloches, against walls or just simply in the open, suggesting early, mid-season and late varieties for the first two systems, and dessert or wine grapes for growing in the open. He stresses the preliminary nature of this first report, but he is already convinced that some of the lesser-known *vinifera* varieties will give excellent results in Southern England. We prophesy that his book will be out of date in next to no time and that the demand for report No. 2 will be tremendous. D.A.

3523. Brown, H. D., and Hutchison, C. S.
Vegetable science.
J. B. Lippincott Co., Chicago, Philadelphia and N. York, and Bedford St., London, 1949, pp. 452, illus., $5 or 35s.

In the preface the authors say they are attempting " to describe fundamental, up-to-date practices in a condensed form for students and for farmers who grow vegetables commercially ". To write for both student and grower is a difficult task, especially when conciseness is required. In this case the grower definitely comes off best. The chapters on green manuring, irrigation and marketing, for instance, contain much useful, practical detail, and the accounts of the cultivation, pests, diseases and varieties of individual vegetables, comprising the second half of the book, are up-to-date. Only commercially grown vegetables are included, and economic practices are given emphasis. Facts and figures are numerous and often interesting, but should be used only for reference, and it is disillusioning to find them included in the " Review Questions " at the end of each chapter. To our way of thinking, no intelligent student should be expected to answer, for example, " How many home gardeners were there in 1943 ? " This is spoonfeeding with a highly indigestible and, surely, not very useful, form of food. The student, too, will often find the scientific principles over-simplified (as, for instance, in the very brief account of photoperiodism, pp. 80-1), and the references to literature insufficiently up to date. The illustrations are clear and the print is large. P.R.-D.

3524. Childers, N. F.
Fruit science.
J. B. Lippincott Co., Chicago, Philadelphia and N. York and Bedford St., London, pp. 630, 304 illus., bibls. numerous, $5 or 35s.

This latest textbook on deciduous fruit growing from the U.S.A. has been written primarily for pomology students at the Universities. The author, himself Professor of Horticulture in New Jersey, submitted his manuscript for criticism to many leading American experts in different parts of the States and the result is an extremely up-to-date textbook with an eminently practical outlook. Compared with such a classic as *The Fundamentals of Fruit Production* [Gardner, Bradford and Hooker], the present work is somewhat noticeable for a lack of the discussions of different theories which were a feature of the earlier work. The present author is rather more definite in his opinions. He makes effective use of illustrations

to demonstrate his points. At the end of each chapter are a set of questions, the answering of which may stand the plodding student in good stead against the day of examination and a list of " suggested collateral readings ". There is, however, little to imply on what authority the text recommendations are based, a fact that, in the reviewer's opinion, must somewhat dissuade the student from plunging haphazard into many of the suggested " readings ". The book is crammed full of facts and the figures given are generally up to date. Since the apple is the most important fruit the whole story of apple growing, from preparation of soil to storing and marketing, is given in detail. This is followed by much shorter separate chapters on pears and quinces; peaches, nectarines, apricots and almonds; plums; cherries; grapes; strawberries; and other bush fruits. Under the control of insects and diseases the author includes useful paragraphs on DDT, on the new oils and dinitros and on such new materials as the hexaethyl tetraphosphate [HETP] group including parathion, and the hexachlorocyclohexane [HCCH] group.

A chapter is devoted to the freezing of fruits and the varieties suitable in each case.

Useful information on journals in English concerned with the science and practice of fruit-growing is given in an appendix. D.A.

3525. CLIFTON, C. E., RAFFEL, S., AND BARKER, H. A. [Editors].
Annual review of microbiology. Volume II.
Annual Reviews Inc., Stanford, Calif., 1948, pp. 532, $6.

This is a review that will serve to keep the biologist in touch with recent work on microbiology. Sections that have some horticultural bearing are those on " Bacteria as plant pathogens ", by W. H. Burkholder, pp. 389-412, bibl. 110, and " Microbiology of Soil ", by N. R. Smith, pp. 453-84, bibl. 220.

3526. DOWSON, W. J.
Manual of bacterial plant diseases.
Adam and Charles Black, London, 1949, pp. 183, illus., 16s.

That plant disease may be caused by fungi has long been known, but that bacteria could bring about serious damage to crop plants was not generally acknowledged before the beginning of the present century when Dr. Erwin F. Smith presented clear evidence that some bacteria were virulent plant pathogens. More recently virus diseases have attracted the attention of very many plant pathologists and the widespread destruction resulting from those diseases has somewhat overshadowed the serious losses sometimes caused by bacterial diseases of plants. Dr. Dowson's book reminds us that bacteria can be a menace not only to man himself, and to his domestic animals, but also to his food crops. Though it is written primarily for the botanist who may have a flair for the interesting though somewhat intricate study of these organisms, its descriptions of symptoms and its 54 photographs will be a useful guide to diagnosis, for those who have to recognize plant diseases and advise growers on their control. In one compact volume, at a price not prohibitive to students, the essentials of the technique of microscopical and cultural tests for identifying these organisms are set out clearly, with tables of cultural reaction of allied species, and then follow descriptions of 74 selected bacterial pathogens comprising " all the known plant diseases occurring in Britain, and those most important in the Dominions, Colonies and Dependencies ", although many others are known. The author states (in the Preface) that these diseases " have never been collected together and treated as a whole ". Readers of *Horticultural Abstracts* may remember, however [*H.A.*, 6: 976] that such a book (712 pp.), begun by the renowned Russian botanist Jaczewski, was completed and published under the direction of his successor, Professor Naumov, in 1936. As it was in Russian and apparently never translated into other languages, it is not well known. The present work, therefore, is a welcome addition to the very few general treatises on bacterial plant pathogens, the technique of studying them, and control measures. There are few misprints to note, but " Hilderbrand ?" (p. 148) should be " Hildebrand ", and " transformed " (p. 80, l. 6), " transferred ".

H.W.

3527. FLETCHER, F. J.
Special glasshouse crops.
Ernest Benn, London, 5th impression, 1949, pp. 70, 3s. 6d.

The author deals in an entirely practical manner with the growing of the following plants in the greenhouse: tomatoes, cucumbers, melons, grapes, sweet peas, flower bulbs, chrysanthemums and various catch crops.

3528. THE FRUIT GROWER.
The Fruit-Grower Year Book 1950.
Benn Bros., Fleet St., London, 1949, pp. 130, 8s. 6d.

This, surely, is one of the most informative short handbooks which has been produced in this country for the practising fruitgrower. It gives the answer to many of the everyday practical questions which confront him and in consequence the horticultural adviser. A few of the subjects on which concise details are given are as follows:

Fruits in Commerce. This includes descriptions of many varieties of 11 kinds of fruit ranging from apples to strawberries. *Fruit Pollination Tables.—Market Glossary.* This describes and gives dimensions of all the commonly used containers for fruit and vegetables.—*The Chief Manures.* Notes on contents and characteristics.—*Pest and Disease Control.—Growers' Co-operative Societies.—The National Farmers' Union Horticultural Organization.—Horticultural Acreages for England and Wales* [from Ministry Fruit Census 1944].—*Horticultural Distributors Town by Town.*

Many other headings precede detailed information on equally important subjects and it is to be hoped that yearly revision will ensure the persistent usefulness of this new venture.

We do suggest that in future issues room be found in the section devoted to Horticultural Bibliography for periodicals, where doubtless *Horticultural Abstracts* will find a place, and that the Commonwealth Bureau of Horticulture and Plantation Crops, established now nearly 21 years and financed by Governments of the U.K., the Dominions and the Crown Colonies, may be

considered " official " enough to appear under Official Horticultural Bodies. D.A.

3529. Jones, O.
Canning practice and control.
Chapman & Hall, London, 1949, 3rd edit., pp. 322, bibls., illus., 36s.

Eight years have elapsed since the second edition of this work [reviewed *H.A.*, 11: 1013] and much progress has been made, so that considerable changes by omission, revision and addition have been necessary in this authoritative work. The manufacture of tin plate is more fully described and the latest evidence on the subject of corrosion is reviewed. The newest methods of analysis and bacterial examination are discussed. Other problems which have recently come to light are considered.

3530. Kelley, W. P.
Cation exchange in soils.
Reinhold Publishing Corporation, New York, and Chapman & Hall, London, 1948, pp. 144, bibl. pp. 12, $4.50 or 36s.

This monograph is an authoritative and lucid review of the subject. The term " cation exchange " is preferred to " base exchange " as including reactions involving the hydrogen ion. In the preface the author states that " The chemical and physical properties of the soil may be profoundly influenced by cation exchange. Perhaps no other aspect of the soil has such far-reaching importance ". In a historical approach, the various theories advanced, culminating in the clay mineral concept, in the development of which the author has played a prominent part, are critically reviewed. The effects of various factors on cation exchange are discussed, and a chapter is devoted to its influence on soil properties, such as acidity, availability of nutrients, physical structure and microbiological activity.

It is a reflection on the extent of our knowledge of the soil organic material, rather than on the book itself, that only 2 pages are devoted to considerations of the organic soil constituents. " This does not mean that organic substances are unimportant. As a matter of fact, quite the contrary is the case. But despite many publications, our knowledge on the organic material is not well advanced." Concentrating entirely on the inorganic cation exchange material, therefore, the author gives information on the properties, identification and estimation of the cation exchange material, and a detailed account of the methods available for determination of exchangeable cations. D.W.P.G.

3531. Knott, J. E.
Vegetable growing.
Henry Kimpton, London, 4th edit., 1949, pp. 314, illus., $4 or 28s.

Written by the Professor of Truck Crops in the University of California, *Vegetable Growing* makes a useful textbook for students of American horticulture. Conceived in the classical tradition, the fundamentals of plant growth and principles of husbandry rather than the changing details of current practice are emphasized. Indeed, the first half of the book is devoted to such general subjects as the development of the industry in the United States, factors affecting plant growth, principles of plant raising, preparation of the soil, irrigation, pest control, and storage. In the second half the requirements and cultivation of individual crops are dealt with in some detail, though necessarily less fully than in Shoemaker's recent book of the same name [see *H.A.*, 18: 1525] in which cultural practice is given more emphasis than scientific principles. The production of vegetables under glass, apart from the raising of plants, is not covered, and vegetable seed production is dealt with mainly from the point of view of the vegetable grower and the factors that influence his choice of seed. Two points will make this book especially valuable to the student: the carefully prepared index, and the selected bibliography for additional reading given at the end of each chapter. P.R.-D.

3532. Krüssmann, G.
Die Baumschule. **(The tree and shrub nursery.**
Paul Parey, Berlin, 1949, pp. 433, bibl. 10, illus.

In this comprehensive book the author draws on his own experience and that of many others in most European countries. The result is a guide to the day-to-day work of the nurseryman on the general technique of sowing, seed treatment, vegetative propagation and the use of growth substances, grading, marketing, etc., with notes useful for individual species. The bulk of the book is devoted to nursery treatment of 446 types of coniferous or deciduous trees and shrubs including the common top and soft fruit species, arranged in alphabetical order of scientific name. In each case particular methods of propagation are advocated. Tabulated details are given on propagation dates for clonal material and seed, on intermediate stocks for apples, pears, cherries, plums, peaches, apricots, quinces and walnuts, and on the diseases and pests and their control of a large number of species.

3533. Long, H. C., and Brenchley, W. E.
Suppression of weeds by fertilizers and chemicals.
Crosby Lockwood, London, 3rd edition, 1949, pp. 96, illus., bibl. in text, 7s. 6d.

This edition differs from the second edition published in 1946 by the inclusion of some 4 pages on some of the new hormone herbicides, e.g. 2,4-D [=DCPA] and MCPA [the active constituent of Agroxone, Methoxone or CLC], together with reference to recent relevant publications and by the addition of a glossary of common and botanical names of English weeds. This book remains a useful, but in some respects rather a scrappy publication, and one hopes that progress in the application of hormone weedkillers may enable the authors to give a more authoritative account of this promising development in any future edition. D.A.

3534. Ministerio de Agricultura, Peru.
La acción oficial en el desarrollo agro-pecuario de la colonización de Tingo Maria; anos 1942-46. **(Official action in the agricultural development of Tingo Maria, 1942-46.)**
[*Publ.*] *Minist. Agric. Dir. Colon. Asunt. orient. Lima-Peru*, 1947, pp. 177, illus. [received 1949].

A summary of the first 4 annual reports (not yet published) of the Agricultural Experiment Station at Tingo Maria, Peru. The programme included extension work and investigations on hevea, cinchona, tea, *Lonchocarpus*, derris, and palm oil.

3535. MORTON, K. P., AND MORTON, J. F.
Fifty tropical fruits of Nassau.
Text House, Coral Gables, Fla, 1946, pp. 114, illus., $3,50 [received 1949].

An attractive, well-illustrated book, intended for visitors, which gives short, non-technical descriptions of tropical and sub-tropical fruits found in the Bahamas. The book should fulfil the authors' hopes that it may lead to a greater appreciation and use of these fruits and their products. Botanical names are given. There is a useful index.

3536. PASSECKER, F.
Die Vermehrung der Obstgehölze und der Freiland-Ziergehölze. **(The propagation of fruit trees and ornamental shrubs.)**
Verlag Hugo H. Hitschmann, Vienna, 1949, pp. 158, bibl. 53.

The author, a well-known authority on his subject, opens a new series of pocket size horticultural manuals, the *Flora-Bücherei*. An illustrated account of propagation methods is followed by a discussion of individual top and soft fruit species and of a few selected ornamental shrubs. A plant list of 25 pages, with instructions for propagation in telegraphic style, forms a valuable conclusion of the little handbook which should have a wide appeal in German-speaking countries.

3537. PIRONE, P. P.
Maintenance of shade and ornamental trees.
Oxford University Press, N. York, 2nd edition, 1949, pp. 436, $5.00. Geoffrey Cumberlege, Oxford Univ. Press, London, 39s.

This book has suffered little change since its first welcome appearance in 1941 [*H.A.*, 13: 337] and it remains probably the most useful general book of its kind with application throughout the temperate zones. It is in two parts, the first of which deals with general maintenance, the second with specific abnormalities induced by pests, diseases and the like and their control. Each chapter is supported by a selected list of references and in addition 16 articles issued since the first edition are listed. No attempt has been made to change the instructions originally given for the control of the various abnormalities, but the author deals in a 13-page appendix with new developments in control under the following headings: Insecticides [DDT, BHC, Chlordane, and HETP], Fungicides [Fermate, Puratized Agricultural spray, Dithane, Oxyquinoline-benzoate], Combination sprays, Modern spraying equipment, New tree equipment [including the pneumatic chain saw], Newer tree paints, Chemical injury to trees, Injury from industrial fumes, Fastigiate or upright trees, Diseases of shade trees, and Insect pests of shade trees. Five new illustrations replace those originally given. It must be admitted that the reproduction of the illustrations in the first edition is markedly superior to that in the second—at least in the reviewer's copy—in which every print is much darker and the detail nearly always less clear in consequence.

3538. PLANT, M.
The supply of foreign books and periodicals to the libraries of the United Kingdom.
Report of a Survey made under the auspices of the Rockefeller Foundation for the Library Association, Library Association, Malet Place, London, 1949, pp. 60, 2s. 6d.

Despite the fact that this small booklet teems with lists and figures it remains eminently readable. It should, moreover, be extremely valuable to librarians and others who want to tap sources of information abroad but are at a loss how to start. Not only are the names given of libraries in different countries willing to co-operate by the exchange of lists of accessions—annotated in some cases—but also a representative list of publishers in foreign countries is included and notes are provided of the best sources of information on new publications in each country. It appears to the reviewer to be the most potentially useful publication of its kind published for many years. D.A.

3539. ROYAL HORTICULTURAL SOCIETY.
The fruit year book, 1949, No. 3.
Roy. hort. Soc. Lond., 1949, pp. 167, illus., 8s. 6d.

Amateur fruitgrowers will again find that this, the third "fruit year book" issued by the fruit group of the R.H.S., is full of interesting information, and the commercial grower, too, will find much for profitable reading. The articles, written by specialists in their subjects, cover a wide field of horticultural problems such as fruitgrowing in Scotland, sprays and spraying machinery, grafting, pruning, and cultural methods, discussions on plums and cherries, and an account of the results obtained in an experimental vineyard in Surrey. Overseas Commonwealth horticulturists have also contributed. The book is copiously illustrated. [Many of the papers are abstracted separately.]

3540. SALAMAN, R. N.
The history and social influence of the potato.
Cambridge University Press, London, 1949, pp. 658, plts. 32, bibl. 841, 50s.

Those who read this book will in future be likely to approach their potato in a spirit of respect, if not of awe. For has not, in its time, this inert and seemingly innocuous tuber inspired a prehistoric religious cult, changed the economic life of nations, served in turn as a source of plenty and of dire famine, maintained whole agricultural populations in deep poverty because of its cheapness and productivity and, in less heroic vein, introduced methods of vegetative propagation hitherto entirely unknown to this country? All this and much beside is set out in full discussion in Dr. Salaman's enthralling work, the writing of which, he says, took nine years. Even so, such is its erudition and so wide a field does it cover, it seems a matter for wonder that he could have done it in the time. The immense bibliography will give some inkling of the research involved.

The strangest chapters, perhaps, are those relating to the archaeological history of the potato of pre-Inca days when the plant, already long cultivated, played a

part of overwhelming importance in the life of the people, and indeed is credited, from the facility with which it could be conserved (as chuño), with alone making possible the gradual progress of the first immigrants from the east by way of the inhospitable antiplano and the Andean passes to the west coast, and so the mastery of a continent. This section, illustrated with a series of plates showing prehistoric pots in which the potato is represented, often as a human being, is of notable interest.

Reaching more modern times, a number of early descriptions of potatoes in Europe are quoted. The persistent legends that Sir Walter Raleigh was the introducer of the potato into Ireland are closely examined: more closely probably than ever before. The satisfying conclusion is reached that to dismiss the claim, as seems now the fashion, is to abjure tradition whilst neglecting contemporary evidence. A chapter is devoted to discussion of the past, present and future varieties of the potato.

Outstanding are the chapters dealing with the potato in Ireland from the sixteenth to the nineteenth century, through famine and post-famine years, and the part played by the plant in the tragedy of that country. Here Dr. Salaman's gifts as a social historian have full scope. His profound learning and the felicity of phrase with which he is able to express it form a combination which carries the reader avidly from page to page. No less gripping are the chapters which deal so comprehensively with the potato through the ages in the Highlands and Lowlands of Scotland, in England, Wales and the Channel Isles, and not only with the potato but with all the events of the times, stirring or otherwise, in which the potato could possibly have been implicated even, as it were, by remote control—and that appears to have been nearly everything.

W. G. Burton of the Cambridge Low Temperature Research Station briefly interposes with a matter-of-fact contribution on " The industrial uses of the potato ". The author then resumes the tale with selected examples of the potato in war, from Cromwell in Ireland to the latest world imbroglio. An essay on the implements of production and their relation to the economics of the crop extends from the wooden digging stick to mechanical lifters and sorters. The potato in the realms of art is not forgotten.

There are 5 appendices. One of them tabulates the factors and consequences involved in the failure of the crop in Ireland over the period 1794 to 1894, on some 40 or more occasions. The consequences range from wholesale emigration to the erection of a monument. The theme running through the book and expressed in the epilogue is that, by providing a cheap and nutritious food and so perpetuating a low wage, the potato has proved itself, through man's stupidity, as the most perfect instrument for the maintenance of poverty and degradation among the masses and in many cases has ended in wrecking both exploiter and exploited. Surely this is a great book. G.St.C.F.

3541. Santos Pereira, M. L.
Abastecimento de produtos hortícolas a Lisboa. **(Supplying Lisbon with horticultural products.)**
Junta Nacional das Frutas, Lisboa, 1949, pp. 211, bibl. 25, maps.

This account of the vegetable production areas, problems of transport, and marketing systems in Portugal gives an interesting insight into the horticultural economy of the country. Nine supply areas for Lisbon are described, their contribution, main crops and season of production being compared. The organization of the important district of Loures in Saloia, the source of 43% of Lisbon's vegetable supplies, is discussed in considerable detail in a separate section. An analysis of methods and costs of production, transport and marketing of this area, indicates that the solution of present difficulties lies in co-operative marketing.

3542. Taylor, H. V.
The plums of England.
Crosby Lockwood & Son Ltd., London, 1949, pp. 152, bibl. 30, 32 coloured plates, 30s.

Part I of this book contains information on cultural considerations together with botanical notes of the various species of plum grown in this country.

The chapters on the botanical characters of plum species, on rootstocks and on pollination bring together much useful information, previously published elsewhere, both for the student and the grower, and the account of breeders of plum varieties gives recognition to fruit breeders of the past and to successful present day breeders such as Messrs. Laxton of Bedford, Mr. G. T. Spinks and Mr. M. B. Crane. The botanical notes would be more helpful to the fruit grower, however, if such formulae as $2n=48$, etc., were explained instead of appearing as mere statements. Little new ground is covered under the heading of " Botanical considerations and Classes of Plums " and the reviewer draws attention to the urgent necessity for systemic pomological work on plums. Actually much has been done, but not published, in this direction by Mr. J. M. S. Potter of the National Fruit Trials.

In describing the technique of hand pollination in the breeding of new varieties the importance of emasculating the flower of the female parent is stressed, but the necessity for care in preventing contamination of the stamens of the male parent is omitted.

The information on blossom periods and pollination is well assembled and the tables showing length and relative period of blossoming of many varieties should be of help in laying out new plantations. The brief survey of plum-growing areas and the varieties grown emphasizes the author's contention that the English plum growing industry has been largely built up on culinary and processing varieties and that heavy cropping capacity rather than quality has been the criterion. The author shows, however, that sufficient is now known of pollination requirements, soils, nutrition, etc., to make the growing of quality plums an attractive proposition. Indeed this book will have justified its publication if it only focuses attention on dessert and other plums of quality which can be grown successfully in England. The diseases and pests chapter is useful but no mention is made of the possibility of using resistant varieties and stem builders to reduce the incidence of Bacterial Canker. Suggestions are made for the selection of varieties both for orchard and garden culture and the chapter on jamming, canning, bottling, drying and juice manufacture quotes the best

available information, but the space given to the chemistry of the plum seems somewhat out of place, and figures given in Chapter VIII and again in Chapter IX for the percentage of sugar in greengages, Victoria and culinary plums, although quoted from the same source, do not seem to agree.

The chapter on plum characters, in which the author attempts a new system for the identification of varieties, is separated unfortunately from Part II by a chapter on the choice of varieties for growing under varied conditions. It would have been better placed immediately before the detailed variety descriptions included in Part II.

The work of Hogg* and others on the classification of plums is somewhat discounted by the author, but it is doubtful if the system put forward by Dr. Taylor whereby plums are identified by the fruits alone will be any better. However, his suggestions, although not based on a systematic botanical approach, should help in the ever interesting and often baffling job of naming varieties correctly from fruit characters alone. An error occurs in the tables under the heading of colour, in that Severn Cross, a pale golden yellow plum, appears in the table of both green and red plums.

Part II is devoted mainly to descriptions of some 120 varieties. These are in very general terms and show little advance on previous descriptions; some varieties appear as little else than a name. The origin of the variety Marjorie's Seedling is not given. This valuable late culinary plum was the result of a chance seedling grown on the farm of Mr. George Layley, Beenham, Berkshire, and named Marjorie after Mr. Layley's daughter. Scions of this plum were first collected, and sent to the R.H.S. in the early 1920's by Mr. A. E. Barnes, Horticultural Instructor for the county of Berkshire. The variety Thames Cross, raised by Mr. G. T. Spinks of Long Ashton, is stated to be similar to Teme Cross but ripening a fortnight earlier. Teme Cross, however, ripens in August, and it is the variety Severn Cross which is meant. This part of the book is, however, most useful. Many varieties, hitherto not known to the ordinary reader, are included, and there are 32 superbly reproduced coloured plates which not only delight the eye but are also a valuable source of reference.

The Plums of England will be a useful addition to the fruit-grower's bookshelf. Who now will deal with the pears ?

E.W.H.

3543. Wolf, F. A., and Wolf, F. T.
The Fungi.
John Wiley & Sons Inc., New York, and Chapman & Hall Ltd., London, 1947; Vol. I, 438 pp., illus., $6.00 [48s. net]; Vol. II, xii, 538 pp., illus., $6.50 [52s. net], bibl. copious.

Volume I deals with fungal developmental morphology and taxonomy. The first chapter outlines the history of mycology, and the second describes methods of isolating and cultivating fungi. The rest of this volume describes the orders of the fungi with representative examples. Volume II is concerned with the physiology of these organisms and of their relation to their environment (nutrition, effect of temperature and radiation, spore dissemination and germination, host penetration, etc.). Three chapters of particular interest to horticulturists and plant pathologists are those on Mycology in relation to plant pathology, Soil fungi, and Fungus-insect interrelationships. Each chapter has an adequate bibliography, and in the two volumes there are over 200 illustrations in the text. It will prove a useful book of reference.

* Hogg's name is also left out in the Bibliography on page 99.

3544. Alaska.
11th Progress Report Alaska Agricultural Experiment Stations 1946, 1949, pp. 55.

Potato variety trials are reported from the Fairbanks Station. In manurial experiments, carried out at the Matanuska Station, the best yields and quality were obtained from the lowest potash application (45 lb./acre). The breeding and crop improvement programme here includes the testing of potato seedlings and the development of a lettuce variety resistant to tipburn. The results of variety trials with early and late cabbage and with tobacco are also reported.

3545. Beaverlodge.
Progress Report Dominion Experimental Station, Beaverlodge, Alberta, 1937-47, 1949, pp. 106, illus.

The chief horticultural work of this station has been the testing of plant material. Species and varieties of hedge plants, ornamental trees and shrubs, herbaceous perennial flowers, flowering bulbs, rock plants and annual flowers, recommended as suitable for the district, are listed. Suitable varieties of soft and top fruit and vegetables are also recommended. Advice is given to local growers on chemical weedkillers, windbreaks and pest control.

3546. Biologische Zentralanstalt Braunschweig.
Nachrichtenblatt der Biologischen Zentralanstalt Braunschweig, 1949, Vol. 1, No. 1, pp. 15.

The journal, which would appear to supersede the *Nachrichtenblatt für den Deutschen Pflanzenschutzdienst* (*H.A.*, 18: 2311) in Western Germany, is the organ of the newly constituted Biologische Zentralanstalt of the British and U.S. Zones. Its object is to combine the publications of original papers with an advisory activity in plant protection.

3547. "De Proeftuin" te Boskoop.
Jaarboek uitgegeven door de vereniging "De Proeftuin" te Boskoop, 1948. (**Yearbook of the Society "De Proeftuin" te Boskoop for 1948**), pp. 89.

The greater part of this yearbook is taken up with a report of the year's work in the Trial Garden, under the headings (*a*) Tree raising, (*b*) Flower culture, (*c*) Investigations. These investigations include work on the effect of soil pH on the growth of various ornamental plants; propagation trials, investigating time of propagation, rooting medium and use of growth substances, with cuttings of ornamentals and apple and plum rootstocks; crossing and selection of roses, rhododendrons, azaleas, loniceras and clematis; a study of how an electrically heated frame can be used most economically in a commercial nursery; and weed control trials with DNC and 2,4-D.

3548. British West Indies.
Thirteenth Annual Report British West Indies Central Sugar Cane Breeding Station, Barbados, 1946, pp. 42 [received 1949].

Steady progress was made with cane breeding, seedling selection and field trials. The number of crosses made, details of which are given, was 114, none of them purely "noble" crosses. "The policy of increasing the variability of the seedling population by making interspecific crosses within the genus *Saccharum* and inter-generic crosses with closely allied species is now beginning to produce results and some excellent seedlings having highly desirable characteristics are being obtained. Many of the more promising seedlings are nearing the commercial stage, e.g. B.41211 and B.41227, while B.4098 has been recommended for commercial planting." A list is given of 28 seedling varieties sent to the Plant Quarantine Station, Trinidad, for eventual distribution to contributing colonies. Of these it is possible that B.4362, B.43235, B.43337 and B.43391 are outstanding. The results from recent trials of some of the newer B. seedlings in 6 contributing colonies of the B.W.I. are reported. The seedlings of the B.42[1] and B.43[1] series were tested for resistance to mosaic disease by artificial inoculation, making use of the Sein method. The "take" obtained was by no means satisfactory. This is in contrast to 100% take obtained when plants were inoculated in the open in 1944.

3549. Campden.
Annual Report of the Fruit and Vegetable Preservation Research Station, Campden, 1948, 1949, pp. 51.

The following investigations of horticultural interest are very briefly reported: (1) Variety trials of peas, stringless and runner beans, the new Cambridge strawberries and Malling raspberries for canning and quick freeze purposes. Pear varieties were also tested for canning quality. (2) The effect of organic spray residues on canned black currants. (3) The effect of fertilizer treatments on the texture of canned peas. The rest of the report concerns canning problems.

3550. Ceylon.
Administrative Report of the Director of Agriculture, Ceylon, for 1947, 1949, pp. 121, Rs. 2.40.

Experiments and investigations, pp. 8-34. Horticulture. In citrus rootstock trials no incompatibility was observed in 7 [named] grapefruit varieties budded on rough lemon. The same scions are giving satisfactory results on sweet orange stocks. Sweet orange varieties under trial at 4 centres were compatible with rough lemon and sweet orange stocks, but showed poor growth and chlorosis on sour orange. Acid lime, which is highly resistant to drought and is easily propagated, is under trial as a stock for citrus. Rootstock trials with mangoes are reported. In avocado trials all varieties tested were compatible with local seedling stocks. Malayan rambutans proved superior in flavour and quality to 1 local and 3 Javan strains. Tobacco trials are reported. Entomology: The results of large-scale field applications of gammexane and DDT against the spotted locust, *Aularches fabricius*, are reported. Preliminary trials of the same insecticides against coffee berry borer and tobacco stem borer were promising. Plant pathology: Work on the scheme for the eradication of plantains affected with bunchy-top disease continued. The existence of Panama disease in bananas was confirmed. Investigations are reported on pink disease (*Corticium salmonicolor*) of oranges, *Sclerotium rolfsii* on jak seedlings, and the control of frog-eye (*Cercospora nicotianae*) in tobacco. Botany: Brief notes are given on the progress made with the classification of Ceylon bananas; the possibility of creating an export trade in Madonna lily bulbs; trials of growth-regulator herbicides against water hyacinth, *Salvinia* spp., and the weeds of annual crops; the performance of various plant selections including lima beans, *Hibiscus esculentus*, and brinjal.

3551. The Cocoa, Chocolate and Confectionery Alliance Ltd.
Report of the Cocoa Conference held at Grosvenor House, London, 30th August-1st September, 1949.
Cocoa, Choc. & Confect. Alliance Ltd., London, 1949, pp. 115, illus.

The main conclusions reached at the Conference were: That there is a great potential expansion in demand which can only be met if new cocoa is planted now. That research is showing results in many directions. More emphasis has this year been laid on disease eradication, better methods of cultivation and site selection in existing cocoa areas than on the discovery and development of new areas. Because of the possibility of failure to stem the tide of disease in the Gold Coast, prudence dictates that a vigorous campaign of planting should be started in new areas with as little delay as possible. The main requirement is still, as last year, to bring swollen shoot disease under control. It is disturbing that in 12 months so little has been accomplished. The members of the 1948 Commission on Swollen Shoot Disease have said in effect: "We fully realize the terrific difficulties of the Department of Agriculture. Nevertheless, all efforts must be made. The problem has not received and is not receiving adequate attention. It must be tackled on a much larger scale than in the past." The conference concurs in this view. The shortage of staff, at all stages of cocoa production and research, is the most important single factor which is retarding progress. Every effort should be made to bring the authorized establishments up to full strength, and in some sections additional personnel should be employed. The quality of cocoa has been insufficiently considered during the past 10 years. Grading, with an adequate price differential for cocoa of the best quality, is a matter of great importance. It has already been introduced in Nigeria and it is hoped that the Gold Coast will follow suit as soon as possible. The same attention to quality is also necessary in the production of fine cocoas.

3552. Colonial Development Corporation.
Report and Accounts, Colonial Development Corporation, for 1948.
H.M. Stationery Office, London, 1949, pp. 31, 1s.

Among the agricultural undertakings financed by the Corporation are tung growing in the Vipya Highlands

of Nyasaland and manila hemp production in North Borneo.

3553. COLONIAL RESEARCH COUNCIL.
Annual Report on Colonial Research 1948-49.
H.M. Stationery Office, London, Cmd. 7739, 1949, pp. 134, price 2s. 6d.

This volume includes the reports of the Colonial Research Council; Colonial Products Research Council; Colonial Social Science Research Council; Colonial Medical Research Committee; Committee for Colonial Agricultural, Animal Health and Forestry Research; Colonial Insecticides Committee; Colonial Economic Research Committee.

3554. COMMITTEE FOR COLONIAL AGRICULTURAL, ANIMAL HEALTH AND FORESTRY RESEARCH.
Recommendations for the organization of Colonial research in agriculture, animal health and forestry.
Colonial No. **219,** H.M. Stationery Office, London, 1948, pp. 16, 4d.

The Committee for Colonial Agricultural, Animal Health and Forestry Research was established by the Secretary of State for the Colonies for the purposes, among others, of advising on the general policy for research within the fields covered by its title, on the provision required for such research, and on the scope and functions of regional and other research institutions in the Colonial Empire. The numerous recommendations of this Committee appear under the following heads, preceded by a statement of policy: general principles in organizing colonial agricultural research; the nature of colonial agricultural research; the conditions for efficient research; regional organization; regional consultative machinery; the form and constitution of a regional research organization; the relation of the regional research organization to colonial departments of agriculture, animal health and forestry; the relation of regional organizations to commodity research stations; relation between regional research organizations and colonial institutions for higher education.

3555. DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, LONDON.
Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1947, being *Food Investigation 1947,* H.M. Stationery Office, London, 1949, pp. 22, bibl. 77, 6d.

This report includes a very brief account of the work carried out during the year at the various D.S.I.R. Research Laboratories. It is fully annotated with references to the scientific papers in which results of this work are published. The following lines of research in progress are of interest. *Low Temperature Research Station and Smithfield Laboratory:* potato storage problems; the nature and cause of the stem-end blackening pigment of potatoes; the rate of production of volatile substances and ethylene by ripening fruit in various storage conditions; the function of ascorbic acid in living tissues; the polysaccharides of the cell walls of pear. *Ditton Laboratory and Covent Garden Laboratory:* the development of the skin-coating technique for storage of apples; storage qualities of 17 promising varieties of mid-season and late dessert apples; potato storage in insulated, air-cooled buildings; the causes and control of low-temperature injury to Victoria plums, with a view to extending the storage life of that fruit; the behaviour of new varieties of banana, resistant to Panama disease, under commercial conditions of handling, and the best conditions for carriage and ripening of the Lacatan variety.

3556. EAST MALLING.
Annual Report of the East Malling Research Station for 1948, A32, pp. 159, 19 plates, 10s.

This report again consists of four parts. I. The Experimental Farm, with details of its working during the year. II. General Review of Research Work, with lists of papers published during the year. III. Research Reports and Reviews, with accounts of certain experiments which have reached the stage when results can be discussed. IV. Bulletins for Fruitgrowers. [For papers in III and IV, see separate abstracts.]

3557. FLORIDA.
Annual Report of Florida Agricultural Experiment Stations for year ending June 30, 1948, pp. 280, illus.

A comprehensive but highly condensed report which contains much of interest to horticulturists, particularly those in the sub-tropics. It incorporates the reports of 9 departments, 7 branch stations and 6 field laboratories. *Horticulture,* pp. 74-94: Among projects reported are: propagation, planting and fertilizing tests with tung; testing of native and introduced shrubs and ornamentals; cover-crop tests in pecan orchards; selection and development of varieties and strains of vegetables for Florida; cultural requirements of the mu-oil tree [*Aleurites montana*]; irrigation of vegetable crops; strawberry variety trials; and vegetable breeding. *Citrus Station,* pp. 146-85: Investigations included work on melanose and stem-end rot; citrus nutrition; combined control of scale-insects and mites; nature, causes and control of citrus decline; biological control of citrus pests; chemistry of insecticides; citrus growing in coastal regions; citrus processing. *Sub-tropical Station,* pp. 247-67: Projects covered concerned the culture of citrus, avocado and minor fruits; potato variety trials; cover crops; control of potato, avocado, mango, and papaya diseases; the pineapple mealybug; selection of mango and guava; vegetable variety trials; the control of insects affecting winter vegetable crops and sub-tropical fruits. *Vegetable crops laboratory,* pp. 116-37: Two major accomplishments of the year were the production of several lines of tomatoes highly tolerant to 2 strains of tobacco mosaic and certain lines combining high yield and good quality with high resistance to *Fusarium* wilt, collar rot, *Stemphylium* leaf spot, and *Alternaria* leaf spot. Dithane-zinc sulphate-lime has proved to be the best available fungicide for use on gladiolus and carrot and is one of the two best for controlling downy mildew of cucurbits, the other being Zerlate. Consistent use of zinc fungicides has resulted in nutritional complications in some instances, as a result of copper deficiency.

3558. FRUIT AND VEGETABLE PRODUCTS RESEARCH COMMITTEE, DEPARTMENT OF AGRICULTURE, CANADA.
Annual Report 1948 and *Supplements.*

The Report contains 9 and the Supplement 2 reports from different centres as noted below:
(i) Kentville, N.S. (Hope, G. W.).
Report of Fruit Products Laboratory, Kentville, 1948-49, pp. 6.
On application of ion exchange to apple syrup manufacture.
(ii) Division of Horticulture, E.F.S. (MacArthur, A., and Harper, G. S.).
Report of Fruit and Vegetable Products Laboratory, Ottawa, 1947-1948, pp. 19.
Effect of freezing on various fruits and vegetables, packaging, nutritional values.
(iii) Summerland, B.C. (Atkinson, F. E., Strachan, C.C., and Moyls, A. W.).
Report of Fruit and Vegetable Products Laboratory, Summerland, 1948-49, pp. 6.
Preservation of colour in apple juice, candying of fruit, varieties of fruits and vegetables for freezing.
(iv) Division of Bacteriology and Dairy Research, Science Service, Dep. Agric. (Jones, A. H., and others).
Report of Division of Bacteriology and Dairy Research 1948-1949, pp. 7.
Microbiology of fruit and vegetable frozen and other products.
(v) Division of Horticulture, C.E.F. (Phillips, W. R., and Poapst, P. A.).
Report on Low Temperature Investigations for 1948-49, pp. 30.
Gas storage of apples, freezing rate studies of fruit and vegetables, fungal rot control, pectin trends in cold stored apples, effect of manuring on storage behaviour of apples. Their studies establish a relation between N levels in the foliage and fruit quality. This is partly modified by K level or N/K ratio and possibly N/P ratio.
(vi) Summerland, B.C. (Fisher, D. V.).
Report of Cold Storage Laboratory 1948-49, pp. 9.
Harvesting and cold storage of McIntosh apples.
(vii) Morden, Manitoba (Shewfelt, A. L.).
Report of Fruit and Vegetable Products Laboratory, Morden, 1948-49, pp. 6.
Freezing preservation of fruits and vegetables.
(viii) Kentville, N.S. (Eaves, C. A.).
Storage Investigations, Kentville, 1948-49, pp. 15.
Storage of Cortland apples, effect of manuring including minor elements, on keeping quality of Spy and McIntosh apples at 32° F.
(ix) Division of Chemistry, C.E.F. (Harper, G. S., and Swann, I. H.).
Report of Fruit and Vegetable Products Research Committee 1948-49, pp. 7.
Ascorbic acid in tomato juices, harvesting dates for peas and sweet corn, freezing and canning, and commercial manufacture of pectin.
[In Supplement]:
(i) Department of National Health (Johnson, L. E., and others).
Survey of Corn Borer Infestation in Canned Corn, Cream style, pp. 4.
(ii) Department of Horticulture, Guelph (Truscott, J. H. L.).
Reports for 1948 Ontario Agricultural College, pp. 12.
This embraces notes of work on temperatures in ventilated stores, canning of rutabaga, storage of cucurbits, effect of freezing and canning on different vegetable varieties, artificial ripening of tomatoes.

3559. Gulval Experimental Station (Abbiss, H. W.).
Growers notes and station record [Gulval] 1948-49.
N.A.A.S., South Western Province, Bristol, 1949, pp. 27.
A description is given of the Roscoff broccoli characters at which the breeder and selector should aim. A number of strains are under trial. The electrical heating of the soil for French beans in 1948 proved uneconomic owing to the markets being over supplied. Cool storage tests on daffodils are reported. Storage at 48° F. for 42, 49, 56 and 63 days advanced the date of flowering in all cases, often by several weeks, and the flowers were of little, if any, lower commercial value and lasted equally long. The effect of first submitting to heat storage at 72° F. for 2 weeks and then cool storing was also tested. Little or no gain accrued from the heat treatment when the bulbs were put in cool store during the safe period, i.e. after the embryo had formed. Cool storage of irises also proved successful. Cool stored irises showed fastigiate and green growth as compared with the spreading silvery growth of normally grown plants. Since it has been suggested that cool stored bulbs are of little use after the first season, a number of plots were left down for a second year. Results suggest that the shorter cooling periods had no flower-reducing effects in the second year. Cooling effects on tulips are also under test. With them nothing appears to be gained by warm storage before cool storage. There was generally a definite advancement of flowering as a result of cool storage. Experiments on the effect of angle of planting different sorts of bulbs and on the control of weeds in bulb beds are in progress.

3560. Harrow.
Progress report of the Dominion Experimental Station, Harrow, Ontario, 1937-46, 1949, pp. 47, illus.
Tobacco. Successful seedling production was found to be more closely associated with plant-bed management than with plant-bed construction. Recommendations are made concerning sterilizing, fertilizing, sowing and watering of seed-beds. Variety trials and breeding projects with burley and dark tobacco are reported. A study of crop rotation systems indicated the advantage of rotation over continuous planting of tobacco, but long rotations showed no advantage over short ones. Rotations including maize preceded by soybeans lowered the yield of burley, but breaks of sweet clover and alfalfa were beneficial. Experiments on fertilizing, spacing, topping and maturing are reported. *Fruit.* Peach variety trials were extensive, and a study of marketing containers was made, Variety trials of apricots, raspberries and grapes were on a small scale. An investigation of the causes of sunscald or "southwest injury", a winter injury of apple trees, showed that tree habit, severity of pruning or cultural methods were not correlated with the degree of injury, but there was a certain amount of varietal resistance, as shown in Rhode Island Greening. As pollinators for Spy, Tolman Sweet and Ben Davis are recommended. *Vegetables.* Includes breeding work

and variety trials with tomatoes and melons, and fertilizer experiments with tomatoes and asparagus.

3561. HONG KONG.
Report of the Senior Agricultural Officer, Hong Kong, for 1947-48, Appendix K, pp. 6.

Reference is made to the steps taken to improve the quantity and quality of vegetables grown in the Colony. At Sheung Shui Agricultural Station several hundred varieties of European and Chinese vegetable varieties have been tested. A list is given of the most promising. The success of these investigations would mean much to the local Chinese population.

3562. HORTICULTURAL EDUCATION ASSOCIATION.
Annual Report H.E.A. 1948, 1949, pp. 55.

A business report ending with a breezy account of the 1948 Conference in Scotland and lists of (1) Officers employed by the Local Education Authorities in England and Wales, (2) Horticultural Staffs in Scotland, (3) Horticultural Staffs in Northern Ireland and in Eire, and (4) Staffs of University and College Departments of Horticulture at the Universities of Reading, London, Nottingham and Bristol, and at Studley College, University College of S. West, Seale Hayne College, Greenmount College (N. Ireland) and University College, Dublin (Albert Agricultural College).

3563. IDAHO.
Fifty-fifth Annual Report of the Idaho Agricultural Experiment Station, Year ending June 30th, 1948, being *Bull.* 270 (Agricultural Research in Idaho), 1948, pp. 68, illus.

The report of horticultural investigations (pp. 33-47) includes the following items. *Beans and peas.* 5% DDT dust gave the best control of pea weevil, and DDT, either alone, with volatile oil, or fused with sulphur, was effective against pea aphid. Selection of garden and field bean varieties for resistance to the curly top, common mosaic and the new mosaic viruses is continuing. *Potatoes.* Factors affecting malformation of Russet potatoes were investigated. Knobby tubers, characterized by outgrowths from one or more of the eyes, are the result of excessive vine growth in relation to the number of tubers per hill; the use of large seed pieces, close planting, and cautious nitrogen fertilizer applications are recommended as preventive measures. Other types of malformation are due to a check in growth early in the season, faulty irrigation being a common cause. A 10% solution of Therapogen was found to disinfect the seed potato cutting knife against bacterial ring rot very effectively. *Vegetables and vegetable seeds.* The results of variety trials of sweet corn, lima beans and peas for processing are reported. Storage losses of carrots were reduced by Fermate and Arasan dusts. Preliminary experiments indicate that a weak solution of 2,4-D, sprayed on to hard-headed lettuce grown for seed production, prevents heading and permits the seed stalk to develop freely.

3564. IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.
Report of the Governing Body and the Principal's Report for 1948, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, 1949, pp. 55.

The section containing departmental reports, pp. 35-55, includes brief references to: forage investigations; banana breeding; soil studies; cacao research (field trials, biochemistry, virus disease); pest survey; *Aphis gossypii* attacking egg-plant; control of mole crickets, chinch bug and grassworm; sugar technology; and the introduction of Mauritius sugar-cane varieties.

3565. INDIAN HEAD.
Progress Report of the Dominion Experimental Farm, Indian Head, Sask., 1937-46, 1949, pp. 60, illus.

The testing of open pollinated apple seedlings has revealed several hardy and productive varieties suitable for western conditions. Of the plum seedlings tested for hardiness and earliness, selections of the Manitoba native plum seemed most reliable for prairie culture. Suitable local varieties of soft fruits, ornamentals and vegetables are recommended. The strains of safflower so far tested have all been too late maturing for culture in that area as an oil-bearing seed crop.

3566. IOWA.
Report on Agricultural Research of the Iowa Agricultural Experiment Station for the year ending June 30th, 1949, pp. 332.

Horticultural work is dealt with on pp. 274-94, from which the following notes are taken:
Horticulture. Acid peat proved superior to alkaline peat for the cultivation of azaleas. *Pomology.* There is a growing demand for small apple trees. It is found that Clark dwarf is well adapted for budding or grafting as an intermediate apple stock on Virginia Crab or Hibernal whips. It is then budded to the desired variety. It is found under midwest conditions that mulch in the apple orchard holds the moisture, keeps the soil cool during hot dry spells, and breaks down and so supplies organic matter to the soil and checks erosion. Breeding is reported on apples, pears, plums and peaches. Girth measurements are recorded for apple trees on 7 different rootstocks. The effect of freezing storage on a number of plums was noted. *Vegetable crops.* Potato breeding is directed towards varieties resistant to scab, late blight and viruses. In fertilizer trials the addition of boron, copper or manganese to soils did not increase yields of sweet potatoes. Other trials reported briefly concern melon manuring, weed control in asparagus, varieties of sweet potatoes, melons, pumpkins, onion breeding, irrigation of sweet potatoes, varieties of canning peas, tomato breeding, factors affecting the sprouting of sweet potatoes, i.e. seed and plant treatment, hot bed temperatures, type of cutting used.

3567. KENTVILLE, NOVA SCOTIA.
Progress Report Dominion Experimental Station, Kentville, N.S. for 1937-46, 1949, pp. 105, illus.

Summaries of the following investigations, among others, are of interest: *Fertilizers for orchards.* Results suggest that nitrate of soda or sulphate of ammonia are preferable to cyanamide as a source of nitrogen for apples, and that spring applications are better than autumn. Applications of 1,600 lb. per acre of 9-5-7 fertilizer were compared with 800 lb., and the yield obtained justified the heavier dressing. *The use of*

vegetatively-propagated rootstocks for apple tree propagation. The behaviour, in the Annapolis Valley, of Malling stocks I, II, IX and XII and 2 seedling stocks, Anis and Beautiful Arcade, budded with Fameuse and McIntosh, were compared. *Frameworking.* The earlier crops obtained by frameworking, compared with topworking, amply repaid the higher cost, but a close spacing of scions (8 inches rather than 16 inches) was not justified. Information was obtained on the most suitable length of scion, the best method of setting, and the best season for grafting. *Fruit and vegetable products.* Varieties of strawberries, raspberries, cherries, plums, pears, beans and peas suitable for canning are recommended. *Storage investigations.* Macoun apples stored best at 38° and Cortland at 32° F. The best keep was obtained with both varieties, when the fruit was picked directly after the starch had disappeared from the core area. Clapp's Favourite and Bartlett pears, as grown in Nova Scotia for canning, both stored best when picked at the green-ripe stage and held at 32° F. Clapp's may be kept at this temperature for 14-17 days without loss of flavour or colour, and Bartlett for 4-6 weeks, prior to canning. *Apiary investigations* included methods of preventing spray poisoning of bees. Creosote and powdered camphor sprayed on the trees proved unsatisfactory as repellents. Special feeding during the spray period, to keep the bees at home, gave more promising results.

3568. KENYA.
Annual Report of Kenya Department of Agriculture for 1947, Parts I, II and III, 1949, pp. 194, 10 shs.

The following items are taken from Part III, Sectional Reports (pp. 23-190). *Pyrethrum:* Results are reported from some of the 30 field experiments harvested, including trials of: cutting back methods, fertilizers and mulch, repeated trimming of stalks, rotations, seedlings *versus* splits, transplanting skill, weeding, cultivation, pests and diseases, etc. Breeding and selection was continued. Eleven new selections with 2% or more of pyrethrins are reported. The high toxic strain 14 × 24 has proved unsuitable for elevations below 7,500 ft. a.s.l. There was no general outbreak of *Ramularia* disease, such as occurred in 1946. *Coffee:* Steady progress is reported in developing the new coffee research station at Ruiru. Biological control of the coffee mealy bug was satisfactory, apart from certain localized cases of parasite failure caused by a hyperparasite. A successful technique was developed for rooting coffee cuttings in frames. A detailed investigation was conducted into the effect of Raoeng pulping compared with normal fermentation. Investigations of the anatomical changes accompanying flower bud development and differentiation, also studies of coffee growth and flowering, continued. Chemical investigations were mainly devoted to studying fertilizer uptake by means of foliage analysis. Field experiments are also reported on the following: multiple *versus* single stem systems, various methods of early stripping, the tonic effect of copper sprays, and on mulching, manuring, holing and varieties. *Horticulture:* Reference is made to new trials of various deciduous fruits on experimental rootstocks, including E.M. stocks. *Sisal:* Brief reference is made to the progress of work at the high level research station at Thika. *Potatoes:* The multiplication and distribution of imported blight-resistant potatoes continued, the 914 series being the most popular. It appears that late blight in Kenya is either strain A or C, or both.

3569. LANDBOUWORGANISATIE T.N.O.
Verslag van het Landbouwproefstation en Bodemkundig Instituut T.N.O. Groningen over 1948. **(Report of the Agricultural Experiment Station and Soil Science Institute T.N.O. for 1948),** 1949, pp. 140.

Although this Institute is concerned primarily with soils and fertilizers, some of the work is directly related to horticultural crops. Fertilizer studies include work on potatoes, beans and peas. The biochemical and physiological importance of amino-acids, especially tyrosine, in potatoes was studied. An investigation into the cause of the sickness of begonias that occurs when they are planted in peat dust indicates that this is not due to lack or excess of a mineral element, but more probably to a micro-organism or toxic organic substance in the peat. There is also some seasonal effect, as the sickness could be induced in spring but not in autumn. Studies of the development of the root systems of agricultural crops include work on the effect of placement of fertilizers on the development of potato roots. The fungi causing pea root rots, so serious in Holland, were isolated and identified, and the resistance of commercial varieties to these fungi is being determined. Interesting work is reported on the preparation, composition and effect of town refuse as an organic manure.

3570. LONG ASHTON.
Annual Report of the Long Ashton Agricultural and Horticultural Research Station 1948, 1949, pp. 250.

In pages 7-21 the director surveys activities and progress. The rest is devoted to individual accounts of projects completed or being done, which are abstracted or noted in the present number of *H.A.*

3571. MADRAS DEPARTMENT OF AGRICULTURE.
Reports of work of Agricultural Stations in the Madras Presidency for 1946-47, 1949, pp. 565.

This volume incorporates the reports of 33 stations, including the two sugar-cane research stations at Anakapalle and Gudiyattam and the following fruit stations. *Coonoor:* Variety, grafting, rootstock and pruning trials are reported, the main fruits grown being apple, plum, pear, peach and persimmon. *Burliar:* Experiments in the propagation of mangosteen, jack, avocado, litchi, durian, breadfruit, allspice, clove and derris are briefly referred to. *Kallar:* Experiments reported embrace propagation, rootstock, progeny trials, and blossom studies with mangosteen; budding trials with mandarin; and various trials with jack, papaya, annona and carambola. *Kodur:* This report is largely devoted to citrus rootstock trials, including tests of stocks for Sathgudi orange and acid lime. Up to date, Sathgudi on acid lime leads in growth. When budded on pummelo stock its performance is poor, like that of its seedlings. No significant difference was observed between treatments in a trial of Sathgudi budded on stocks of 3 sizes, big, medium and small. The performance of Sathgudi orange budded on *Feronia*

elephantum is recorded. Mango trials were mainly concerned with propagation methods, rootstocks of different ages, polyembryonic rootstocks, and double working.

3572. MAURITIUS.
Nineteenth Annual Report Sugarcane Research Station, Mauritius, 1948, 1949, pp. 44, 60 cents.

The successful breeding work of this station, established in 1929, has led to a spectacular change in the cane variety position in the island. In 1940 the variety M134/32, bred by the station in 1932, occupied only 2% of the cane area (40% being under White Tanna and 40% under BH 10/12), whereas by 1948 this successful [4th nobilized glagah] variety occupied 80% of the area, a further 15% being under other new M seedling varieties bred by the station. The sugar industry of the Colony has also benefited greatly from other activities of the station, notably through improved knowledge of soils, plant nutrition, and herbicides. *Cane breeding:* The main objects of the breeding programme are set out and details given of the crosses made and variety trials carried out during the year. *Chemical division:* The principal line of work has for some years been the carrying out of a comprehensive series of factorial experiments with the object of collecting data which would render the foliar diagnosis technique more precise and definite with regard to nitrogen, phosphate and potash requirements. The investigations have proved of real value. The results of numerous fertilizer and other trials are reported. *Botanical division:* Herbicidal investigations continued to be a major activity, particular attention being given to evolving methods for controlling those weeds which have so far proved resistant to the so-called hormone type of weed-killer. Results are recorded. For certain resistant weeds (named) a solution of the isopropyl ester of 2,4-D in diesel oil is considerably more effective than the various forms of 2,4-D and Agroxone. *Extension service:* The activities of this new division were mainly directed towards improving the agricultural methods of the small [Indian] planters whose cane yields per acre are about half those obtained on the estates.

3573. MELFORT.
Progress Report of the Dominion Experimental Station, Melfort, Sask., 1936-46, 1949, pp. 72, illus.

Horticultural work consists mainly of testing fruit and vegetable varieties for their usefulness under local conditions. Suitable varieties are recommended.

3574. MICHIGAN.
87th Annual Report of the Secretary of the State Board of Agriculture of the State of Michigan and *61st Annual Report of the Agricultural Experiment Station from July 1, 1947 to June 30, 1948,* being *Bull. Mich. State Coll. Agric.*, 1949, Vol. 43, No. 23, pp. 310.

The volume comprises 48 very short reports on State College activities, many containing large numbers of lists of names. So far as the Experiment Station is concerned, notes concern herbicides, especially the hormones; other uses of hormones, e.g. to check fruit fall, increase fruit set in tomatoes and prevent bolting in celery; breeding mint resistant to fusarium wilt; cherry yellows; and spraying with Geon 3IX (a water-soluble plastic) for the retention of needles on Christmas trees.

3575. NEW HAMPSHIRE.
Sixtieth Annual Report of the New Hampshire Agricultural Experiment Station, being *Stat. Bull.* 376, 1948, pp. 35, illus.

Among the findings of this station, here very briefly reported, the following are of horticultural interest. Fertilizing with potassium sulphate produces a higher starch content in potatoes than fertilizing with potassium chloride. Stored potatoes treated with a sprout inhibitor (a methyl ester of naphthaleneacetic acid) at the end of the rest period in March were still in a saleable condition in late August. HETP, DN 111, DND 4, and Xanthone all gave good initial reduction of the European red mite population on apple trees; HETP, however, does not kill the eggs though it does affect the natural parasites. Parathion was superior to nicotine and DN in control of eye-spotted bud moth on apples. A vigorous new strawberry variety, Great Bay, has been released. A hay mulch will reduce magnesium leaf scorch on apple trees, but may require 4-6 years to take effect. Of the 8 new fungicides tested, Phygon, Puratized and Magnetic sulphur gave the best control of apple scab. The effectiveness of several herbicides, including Ammate, Granular Borax and various formulations of 2,4-D in the control of Canada and bull thistles, hawkweed, poison ivy and other weeds is reported.

3576. NEW JERSEY.
Annual Report of the New Jersey Agricultural Experiment Station, Rutgers University, 1947-48, pp. 140, illus.

The following items have been picked from a report covering a wide field. *Vegetables.* The causes of "internal browning" of tomatoes, a condition first noted in 1946, are being investigated. Affected fruits were found to have a low K and high Mn content; in one field trial the percentage of damaged fruit was reduced by spraying the plants with a dilute solution of iron sulphate. The most effective control for bacterial leaf spot of peppers is to soak the seed in corrosive sublimate solution, rinse and dry it, and then dust with Arasan. *Chemical weed control.* On light, sandy soils 2,4-D used as a pre-emergence herbicide on sweet corn injured the crop and only moderately controlled weeds. *Tree fruits.* Two types of container have been devised that will enable growers to market peaches in the ripe state without bruising. Four new large-fruited nectarines, suitable for growing in New Jersey, are being introduced. *Small fruits.* The Sparkle variety of strawberry has a very low boron requirement; excess boron results in marginal necrosis of the leaves, and conical-shaped, duller fruits. *Ornamentals.* Commercial gravel culture of orchids permits considerable saving of labour during the period between the "community" stage and maturity. Culture in pots rather than beds has given the best results with less check to growth when the plants are moved. *Nutrition.* In an investigation on the effect of soil on the food value of crops, samples of vegetables from 10 States were

analysed. Those from the Coastal Plain States tended to contain less ash, calcium, magnesium, copper, potassium, boron, iron, molybdenum and cobalt, and more manganese and sodium, than those from States farther west.

3577. NOVA SCOTIA FRUIT GROWERS' ASSOCIATION.
85th Annual Report of the Nova Scotia Fruit Growers' Association 1948, being Proceedings of the Convention held at Kentville, N.S., Dec. 1948, 1949, pp. 160.

Papers read at this convention cover many aspects of the Canadian fruit growing industry. They include "Some notes on pear and stone fruit culture in Ontario", with an interesting discussion on the trends in cover cropping and mulching of orchards; "The place of cranberries and blueberries in [the Annapolis] Valley agriculture", and "The possibilities of hop production in the Annapolis Valley". From the Kentville Experiment Station are reported trials indicating that infestations of buffalo tree-hopper in apple orchards are considerably increased by vetch cover cropping, and data are given on the winter hardiness of cherry and peach varieties.

3578. NYASALAND PROTECTORATE.
Report of the Department of Agriculture, Nyasaland Protectorate for 1947, Pt. I, 1948, pp. 18, 2s. 6d., and Pt. II, Experimental work, pp. 15 [received 1949].

Part II—Tung: The main work of the Tung Experiment Station continued to be the improvement by selection of *Aleurites montana* and its vegetative propagation on seedling rootstocks. More attention was given to the selection of trees of a form which would allow tractor cultivation beneath them. In trials of buddings *versus* seedlings, buddings on *A. montana* rootstock have significantly outyielded all other buddings or seedlings, but seedlings were more vigorous than buddings. *A. fordii* stock exerts a dwarfing effect compared with *montana* stock. Results from 1947 yield trials further stress the importance of good cultivation and soil fertility for high yielding clones. Four *montana* clones are recommended: ZM13 and ZC2A among the more vigorous and slower maturing A types, and Nos. 10 and 14 among the smaller, and quick cropping, B types. Evidence from manurial trials indicates that lack of N is limiting yields and tree growth on tung estates. The benefit of thorough cultivation of tung during its early years with a non-exhausting inter-crop, e.g. soya, has been shown to persist for years. *Tea:* The experiment in the down pruning of old tea confirmed earlier indications that less crop is lost by tipping low. Results to date show that crop is lost by tipping higher than 2 inches in the case of clean pruned China Jat. Experiments in the treatment of young tea indicate that, irrespective of the pruning methods used to bring it into bearing, the yield after 4 years is likely to be the same. In a spacing experiment planted in 1941, the closest spacing, $3\frac{1}{2} \times 3\frac{1}{2}$ ft., has been consistently best. Investigations of different methods of pruning and extending the pruning cycle indicate that on tea up to 10 years old highest yields are obtained from cut-across treatments, and that extended pruning cycles result in higher yields. The conclusion drawn from cultivation experiments is that, provided weeds are kept below the plucking surface, cultivation of tea is not essential for maximum yields.

3579. OREGON.
Oregon's agricultural progress through research, being *A.R. Ore. agric. Exp. Stat. 1947-48* and *Stat. Bull.* **461,** 1948, pp. 138, illus.

Includes brief reports on investigations into the following. *Potatoes:* insecticides for controlling the vectors of virus diseases, a new disease called "late-breaking virus". *Hops:* breeding and selecting, the stimulation of flowering by controlled lighting, tests of resistance to downy mildew and of substitutes for nicotine sulphate against hop aphid, irrigation and manuring. *Tree fruits:* breeding and selecting, better pear storage by removal of volatile gases from stores, soil deficiencies in relation to storage quality, virus diseases of stone fruits, control of prune thrips, fungicide tests, aerosols against codling moth, toxic spray residues; apple storage and shipping. *Small fruits:* breeding and selection, use of sawdust mulches, virus diseases of strawberry, raspberry rust, boysenberry stamen blight, control of orange tortrix, oblique-banded leaf roller and the leaf-tier. *Nuts:* control of pests and diseases, a blight-resistant Chinese chestnut, a suction harvester for filberts, filbert butter and filbert flour from waste nuts, manuring. *Vegetables:* breeding and selection; control of carrot rust fly, tuber flea beetle of potatoes, squash bud-union maggot, bean symphylids, celery blight, white mould of beans, carrot breakdown, downy mildew of onions, and virus diseases of cucumbers and peas; vegetable seed production problems. *Nursery:* rose and holly production, forcing Croft lily bulbs, dwarf and semi-dwarf apples, selection of Oregon wild plums. *Weed control:* herbicides for Canadian thistle, gorse, quack-grass, etc.

3580. PALMIRA.
Resumen del informe de labores experimentales de la Estación Agrícola Experimental de Palmira, Junio de 1948 a Junio de 1949. **(A summary of the report on the experimental work done at the Agricultural Experiment Station, Palmira, Colombia, June 1948-June 1949.)**
Not. agron. Palmira, 1949, **2**: 57-69.

Variety trials with tomatoes, grapes and citrus are reported. An experiment to determine the extent to which the rootstock is responsible for granulation of citrus fruit has so far given no result. Work on yuccas included variety trials, an investigation on the best size for cuttings, and an experiment to compare the effect on vigour of 3 rates of application of compost. The intermediate rate, of 40 tons per hectare, gave the best results. Results of a study of the abnormal proliferation of buds of mango and a gall of cacao flowers suggest that both these disorders may be due to attack by a species of *Eriophyes.* The investigations on the cause of "rayadilla" disease of plantains included a study of the relationship between nematodes and affected plants, and of the pathogenicity of other possible agents. Several varieties of sugar-cane have been bred that compared favourably in yield with POJ 2878. At the substation in Puerto Tejada work is being done on selection of high yielding cacao trees,

vegetative propagation of cacao, and undercrops suitable for cacao plantations. Much of this work is still in the preliminary stages.

3581. PURDUE UNIVERSITY.
Sixty-first Annual Report of the Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1948, pp. 147, illus.

The following items selected from this report may give an idea of the wide range of horticultural investigations carried out at the station. *Tomatoes.* Breeding work and variety trials. *Potatoes.* The use of DDT for insect control in potatoes was found to keep the vines green late in the season and prevent tubers becoming well matured by harvest time. Four or five applications proved sufficient to control pests, so it is advisable to discontinue DDT sprays in August. *Miscellaneous crops.* Experiments in the use of artificial light for forcing chrysanthemums showed that the standard Indianapolis varieties were excellent for forcing from November to May, but Marketeer and Corona cannot be recommended for late forcing. Of the pompoms, Illinois Gem, Illinois Velvet and White Caps gave excellent results. *Orchard studies.* Soil management studies of apple orchards emphasized the value of a mulch of straw or shavings and manure, with no chemical nitrogen, on the growth and production of trees in sod. This produced trees of manageable size, well supplied with fruit buds. Trees in sod given annual dressings of nitrogen tended to make excessive growth and require more pruning, although production was good. There was also a greater tendency to biennial bearing. The yield of trees in cultivated ground remained far below that of trees in sod or mulch, and the colour of Delicious fruit was adversely affected.

3582. QUEENSLAND.
Annual Report of the Department of Agriculture and Stock, Queensland, 1946-47, pp. 109 [received 1949].

Horticulture, pp. 19-22: Experimental work is reported on: the improvement of refrigerated trucks for carrying fruit and vegetables; wastage and storage of pineapples, ripening and packing bananas; artificial ripening of Williams' pears; substitutes for oiled wraps in storing apples; planting distance for grapes; phylloxera-resistant stock; maturity standards for pineapples, grapes, apples, ginger, and beans. Brief reference is made to the work of the experiment stations at Maroochy, Kamerunga and Redlands.

3583. RHODE ISLAND.
60th Annual Report Rhode Island Agricultural Experiment Station, 1947, being *Contr.* **722**, 1948, pp. 72.

Fruits (pp. 13-20). Work is reported on: the relation of humidity to water loss in stored apples; carbon dioxide storage for plums, raspberries and apples; mulches for blueberries. *Potatoes* (pp. 38-40): tests of new varieties, economical manuring, soil fertility status and effect of pH on yield and incidence of scab. *Vegetables* (pp. 55-62): cabbage and hybrid tomato variety trials, cucumbers and musk-melons resistant to downy mildew, effect of spacing and fertilizers on sweet corn yields.

3584. RHODE ISLAND.
61st Annual Report Rhode Island Agricultural Experiment Station, 1948, being *Contr.*, **734**, 1949, pp. 38, illus.

Fruits, pp. 8-12: The results of storage tests of apples at constant temperature, but different degrees of humidity, are briefly outlined. The study of CO_2 in relation to the control of storage scald in apples continued. The influence of various mulches, including sawdust and straw, on the soil temperature below blueberries and on the reduction of labour costs in strawberry growing are outlined. *Potatoes*, pp. 21-4: Sequoia and Green Mountain were rated first and second in 1948 trials, the results of which are summarized. Results from field experiments indicate that potato growers are in many cases using more fertilizer than the crop needs. The effects of 2,4-D in controlling weeds in the potato crop are briefly discussed. *Vegetables*, pp. 31-4: The yields, over 10 years, of 5 vegetable crops following various cover-crop treatments are tabulated. The results show the need for manuring cover-crops. Vegetable variety trials are reported.

3585. SOUTHERN RHODESIA DEPARTMENT OF AGRICULTURE.
Summary of the Annual Report of the Horticulturist for 1948.
Rhod. agric. J., 1949, **46**: 257-60.

The horticultural industry continues to expand favourably, and specialization is becoming more apparent. *Sub-tropical experiment station, Umtali:* Brief reference is made to onion variety trials and tung selection, as well as to granadilla, mango, and avocado records, the selection of virus-resistant strawberry strains, new plantations of citrus, bananas, coffee and oyster nut (*Telfairia pedata*).

3586. TANGANYIKA TERRITORY.
Annual Report of the Sisal Experimental Station for 1947, 1949, pp. 21, 50 cents (6d.).

Most of this report is devoted to a review of the results of numerous carefully designed field experiments to study various ways of growing sisal, with particular reference to spacing and cutting. These aspects of sisal growing have been given considerable prominence in the past. To-day the station is primarily confronted with questions relating to the maintenance of soil fertility and plant nutrition, as may be seen from the results of the second cycle of certain field trials. The selection of agave hybrids, mainly back-crosses of *A. amaniensis* and *A. angustifolia*, was continued. Further crossings were made. An exceptionally bad outbreak of sisal weevil (*Scyphophorus acupunctatus*) caused much damage to field experiments. Deficiency diseases became more evident in some of the older trials.

3587. UGANDA.
Annual Report of the Uganda Department of Agriculture, Part II, Experimental, for the period 1st April, 1946-31st March, 1947, 1949, pp. 99, shs. 3.

The 8 sectional reports incorporated include short notes on experimental work with bananas, cinchona, coffee, potatoes, sweet potatoes, tobacco and other crops.

3588. U.S. Department of Agriculture.
Report on the agricultural experiment stations, 1948.
U.S. Govt. Printing Office, Wash., D.C., 1948, pp. 157, 35 cents.
An outline is given of the approved programme for 1948, together with a condensed survey of the enormous amount of work in progress and some results achieved. Work reported includes that on orchards, small fruits, vegetables, ornamentals, plant diseases, insect pests, and agricultural engineering. For details of the work done readers should consult the reports of the numerous state agricultural experiment stations, the addresses of which are given, with the names of their directors. There is a subject index.

3589. Utah.
Biennial Report Utah Agricultural Experiment Station 1946-48, 1949, pp. 50, being *Bull. Utah agric. Exp. Stat.* **336.**
Among the many results discussed in a few lines the following two only are of horticultural interest: (1) Use of N and P fertilizers in peach orchards increased yields over 60%. N fertilizer also materially increased the growth of the tree as determined by trunk diameter and annual terminal growth of the branches. (2) Studies on the use of 2,4-D in weed control have shown that effective results can be obtained with about half the dosage generally applied. The lighter rate recommended has the twofold advantage of saving cost and of increasing crop yields as a result of reduced injury.

3590. Vermont State Horticultural Society.
Proceedings of the 51st Annual Meeting, Vermont State Horticultural Society, 1947, pp. 84 [received 1949].
New developments in spraying methods were discussed by two speakers, the construction of spray masts, the value of the speed sprayer, mist blower, sprayer duster, airborne outfits, the fog generator, and steam generator, being considered. A paper on the control of apple scab in New York showed that in this district the use of flotation sulphur gives better results that lime-sulphur if the spraying is timely and thorough: the value of the Spray Information Service for the correct timing of sprays was noted. Apart from Fermate, the newer fungicides all have certain shortcomings that make their inclusion in the spray programme unwise. Other papers dealt with apple grading in Vermont, fruit marketing, selection of soils for apple and strawberry production, and some of the new spray materials.

3591. Vermont State Horticultural Society.
Proceedings of the 53rd Annual Meeting, Vermont State Horticultural Society, 1949, pp. 88.
A paper on the principles of bee pollination of apple trees gives interesting information on the relative value of solitary and honey bees, methods of training bees to pollinate the apple crop, and the type of colony and number and arrangement of hives required in an orchard. Oyster-shell scale, a pest that has seriously increased in the last 15 years, is dealt with in another paper; a late dormant application of a dinitro spray and summer applications of DDT when the eggs are hatching are recommended as control measures. Subjects dealt with by other speakers include the problem of red-banded leaf roller in New York, the use of concentrate sprays in apple orchards, the economics of apple marketing in Vermont and new developments in strawberry and raspberry breeding in New England.

3592. Zürich-Oerlikon.
Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1947/48. **(Report of the Zürich-Oerlikon agricultural research station for 1947/48.)**
Landw. Jb. Schweiz, 1949, **63**: 321-96.
Boron applications to potatoes continued to give good results in trials carried out at 20 places. If applied to the furrow, a dosage of 5-10 kg. per hectare appeared best. Too high or too frequent applications of boron should be avoided. Vegetables were included in the seeds tested.

3593. Commonwealth Bureau of Soil Science.
Proceedings of the First Commonwealth Conference on Tropical and Sub-tropical Soils, 1948.
Tech. Commun. Comm. Bur. Soil Sci. **46,** 1949, pp. 235, price 25s.
This Conference, at which the following papers were presented, was held at Harpenden, England, in June, 1948. These papers are grouped under the four subjects that were discussed, one at each of the sessions of the Conference, and each group of papers is followed by a summary of the discussion that took place. The four main subjects discussed were: tropical and sub-tropical soils, soil classification, fertility problems, and soil erosion.

3594. Scottish Fruitgrowers' Research Association.
The Growers' Digest, 1948 and 1949, Vol. **1,** Nos. 1 and 2, pp. 70 and 76, 2 Silvermuir, Lanark, 2s. a number.
A new journal devoted to the interest of the fruit-grower north of the Border. The chief aim expressed in the first number is to bring to the notice of growers the latest research in the industry, and an excellent start has been made. Among articles of much more than local interest are those by C. H. Cadman, Raspberries: research and current problems [No. 1, pp. 26-32] and by R. D. Reid, Strawberries: the grower and the research worker [No. 2, pp. 41-52]. Both these crops, mainly as a result of virus troubles in the raspberry, and virus, eelworm and red core in the strawberry have suffered temporary eclipse in Britain and it is thanks to the research workers that their revival seems imminent. The vegetable grower is not forgotten, with articles on tomato and shallot diseases. We note in the second editorial the following hope: ". . . that our collection of Horticultural Abstracts will make interesting reading". We join in that hope, since most of them at least are reproduced, with acknowledgement, from *Horticultural Abstracts.*

3595. Soilless Culture Society.
Journal of the Soilless Culture Society, 1949, Vol. **1,** No. 3, pp. 26. (Mimeographed.)
To those interested in soilless culture this small, unpretentious journal can be commended. The articles in

the present number are of a severely practical nature and concern: chemical aspects of the method [hydroponics and aggregate systems], a simplified method of soilless culture, and experiences of a beginner. The subscription for full membership is £1 1s. a year and to the journal only 5s. The Secretary is C. E. Ticquet of 20 Dark Lane, Hollywood, Birmingham.

3596. (VITICULTURE.)
Viticulture Arboriculture.
Published monthly by Les Presses Documentaires, 28 rue St. Dominique, Paris, 7e, Subscription in France 1 year 900 fr.
Since March, 1948, this journal has taken the place of the *Revue de Viticulture*. It has taken on a less academic appearance and now concerns modern scientific practice in both viticulture and fruit growing. Its contributors include men in the forefront of French horticultural enterprise, both in France and overseas.

3597.
The following publications have also been examined:

a **77th Annual Report of the Danish Seed Testing Station for the year 1st July, 1947, to 30th June, 1948.** [Danish with English summary 2¼ pp.]
Tidsskr. Planteavl., 1949 (?), **52**: 563-627.

b ***52nd, 53rd and 54th A.R. Minnesota agric. Exp. Stat., 1944-45, 1945-46, 1946-47,*** pp. 28, 32, and 30 [received 1949].

c ***25th A.R. nat. Inst. agric. Bot., Cambridge, for 1947-48,*** pp. 22.
Brief notes on vegetable and potato trials.

d ***A.R. North Carolina agric. Ext. Serv.*** 1948, pp. 34.

e ***C.R. officiel Conf. int. Cacao, Londres, 1, 2 and 4 Oct., 1946.***
Office Int. Cacao et du Chocolat, Brussels, pp. 155 [received 1949].

f ***57th A.R. agric. Exp. Stat. Lafayette, Indiana, 1943-44,*** pp. 102 [received 1949].

g ***A.R. Queensland Dep. Agric. Stk, 1945-6,*** pp. 88 [received 1949].

h ***59th A.R. R.I. agric. Exp. Stat.*** 1946, *Contr.* **703,** pp. 56 [received 1949].

i ***A.R. Dep. Agric. Sierra Leone 1947,*** 1949, pp. 54, 1s. 6d.

j SMALLHOLDINGS ADVISORY COUNCIL.
Smallholdings.
First report of the Smallholdings Advisory Council to the Minister of Agriculture and Fisheries on the administration of Part IV of the Agricultural Act, 1947. H.M. Stationery Office, London, 1949, pp. 61, 1s. 3d.

k **Report on the Sugar Experiment Stations, British Guiana, for the year 1948.**
Sugar Bull. Brit. Guiana Dep. Agric. **17,** 1949, pp. 51-7.

l ***A.R. Uganda Dep. Agric. 1947, Pt. I—Administrative,*** 1949, pp. 63, shs. 2.

m UNESCO.
Study abroad. International handbook. Fellowships, scholarships, educational exchange. Supplement to Volume I, 1948. [See *H.A.*, 19: 1661.]
UNESCO Publ. **306,** Paris, 19 Avenue Kléber, (? 1949), pp. 63.
Obtainable from H.M. Stationery Office in Great Britain.